

DECEMBER 1, 1947

Engineering Library

AUTOMOTIVE INDUSTRIES

The Industrial News Authority Devoted to Automotive Products for Land, Air & Water

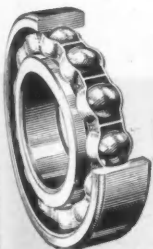


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SERVICE**

AUTOMOTIVE INDUSTRIES

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December 1, 1947

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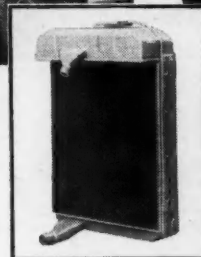
December 1, 1947

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White Motor Co. Model WB heavy-duty truck, equipped with Young Radiator of pressed tank and side-member construction.



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and for **UNIVERSAL FORD SERVICE!**

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Nearly all such machinery—whether pumps, electric generating plants, compressors, power units, saw rigs, ventilating and spraying units, or other portable equipment—by its very nature, will spend its service life on jobs where it's "on its own"—where reliability and ready maintenance service are all-important—and where the transportation of motor fuel makes gasoline economy a constant concern.

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automotive mechanics are thoroughly familiar with Ford engines. Ford economy is famous. And Authorized Ford Service is available in every community of any importance.

Certainly, then, if your power requirements come within the range of 40 to 100 horsepower, you could not choose an engine which would offer you as many positive advantages as Ford.

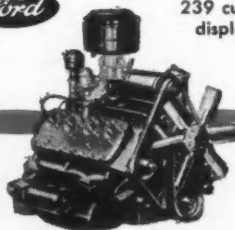
Three Ford-built engines are now available, as shown below. You can buy them singly or in quantity, through any Ford Dealer or from Ford Motor Company. For detailed specifications and dimensional data, write—

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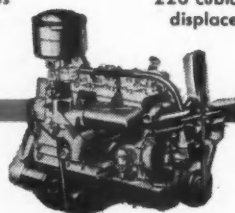
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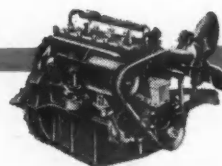
THE 100-H.P. V-8
239 cubic inches
displacement



THE 90-H.P. SIX
226 cubic inches
displacement



THE 40-H.P. FOUR
119.5 cubic inches
displacement



FORD-BUILT ENGINES

FOR INDUSTRIAL AND MARINE POWER

Some High Spots of this Issue

Paris Automobile Show

Featured at the 1947 International Salon in Paris were a new rear-engine V-8 Italian Fraschini, several new small French cars, and an imposing array of other late models from Great Britain, Czechoslovakia and the United States. Complete descriptions of these designs are contained in an article written by AUTOMOTIVE INDUSTRIES' European Correspondent W. F. Bradley, on pages 26-30.

Latest Trailer Coaches

The 13th annual National Trailer Coach Show, held in Philadelphia recently, exhibited a host of beautifully-decorated, modernly-equipped homes on wheels, some of which are illustrated on pages 32 and 33.

Automotive Torque Converters

Latest developments in automotive torque converters and hydraulic couplings, as contained in three papers which were recently presented before the National Conference on Industrial Hydraulics, are discussed on pages 36 and 37. Robert C. Mack, Engineering Editor, introduces these abstracts with a short summary of the Conference highlights.

The Aircraft Industry States Its Case

A forceful article on the status of the aircraft industry, authored by Robert McLarren, is combined with abstracts of several of the reports recently presented by aviation executives to the President's Air Policy Commission in an article beginning on page 40.

Tariff Reductions

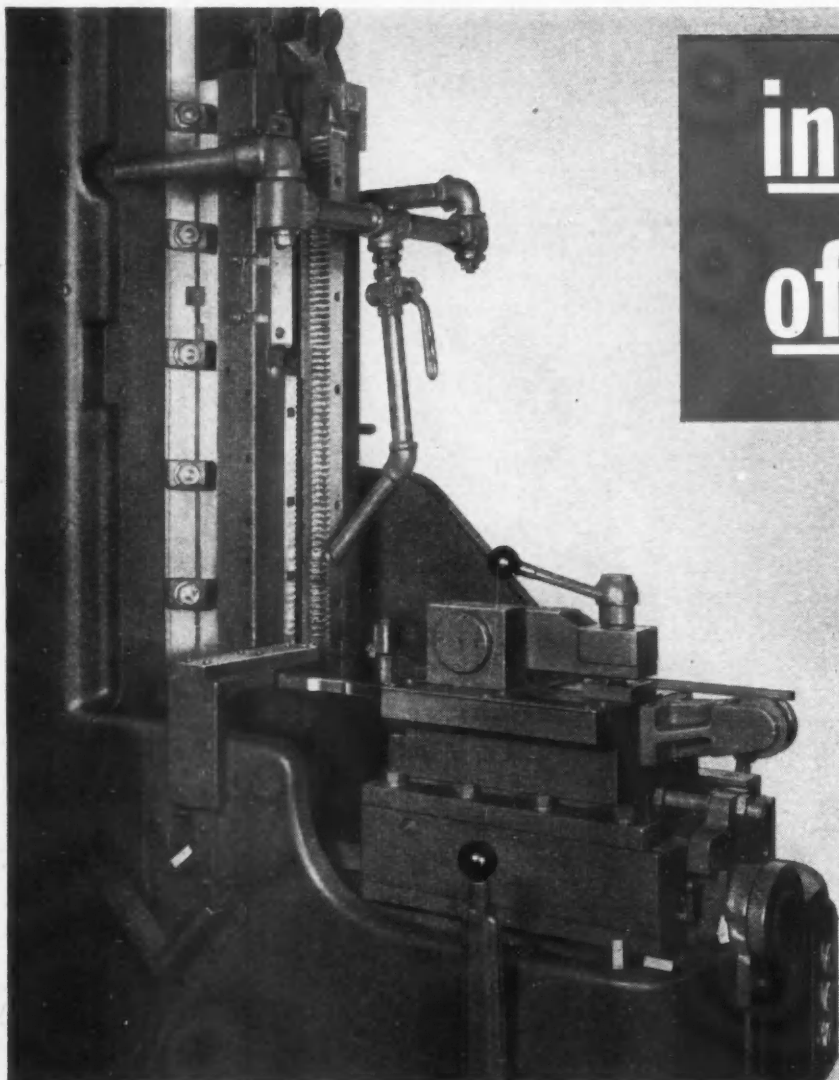
The Geneva Trade Agreement provides for drastic reductions in import rates on passenger cars, trucks, tractors and aircraft by Australia, Czechoslovakia, Norway, France and Chile. Detailed information on these tariff changes is summarized in an article by Eugene Hardy, Washington Editor, on pages 45 and 46.

27 New Production Equipment and New Product Items And Other High Spots Such As:

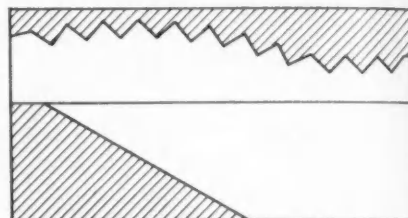
Production of Houde silicone engine dampers; Allis-Chalmers' new Diesel tractor; The Mack Manufacturing Corp.'s method of using positioning jigs for building frames for its C-41 buses; current developments in body engineering as covered by the convention of the American Society of Body Engineers; and drawings of the Kaiser-Frazer engine.

*Comprehensive Interpretation of News of the Industries, Page 17
For Complete Table of Contents, See Page 3*

BROACHED, CUT OFF, EJECTED



in one cycle
of the ram!



Drawing of jaw insert for pliers, about two times actual size.

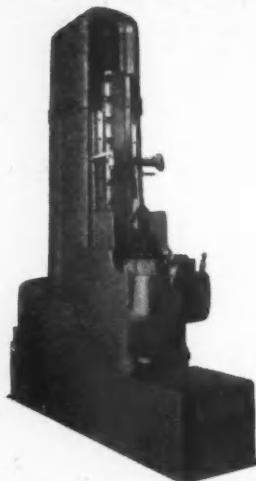
Part Name: Jaw Insert

Material: Steel bar stock

Operation: Broach serrations and angle, and cut off

Stock Removal: From solid

Production: About 200 per hour



CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach. Complete specifications may be obtained by writing for catalog M-1389-1.

The plier jaw drawn above started out as bar stock! In one broaching cycle, the equipment illustrated broached the serrations and the chamfer, cut it off from the parent bar, and ejected it into a chute. The operator merely clamps and unclamps the fixture, and feeds the bar stock forward. ¶ This is another example of the work of Cincinnati Application Engineers in devising the lowest cost method, and then selecting the right machine (in this case a CINCINNATI No. 3-48 Single Ram Vertical Hydro-Broach) and tooling it up ready for production. These men offer their ingenuity and experience in reducing costs in your shop. Send blueprints of parts within the high cost bracket, along with complete details, to the address below. Cincinnati Engineers will give you their recommendations.

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CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES

of the AUTOMOTIVE INDUSTRIES

**Ford Postwar Expansion
Up \$100 Million from 1945**

In June, 1945, Henry Ford II announced that his company was planning to spend \$150 million for postwar expansion and improvement. In Chicago, during November, E. R. Breech, Ford executive vice president, revealed that Ford has "open appropriations" amounting to \$250 million for improving and enlarging its operations in the United States. He added that during the next five years, the company will probably spend twice that amount at the rate of \$100 million a year to improve its production and facilities and to expand capacity to serve the American people. He pointedly asked his audience "do you suppose for one moment that we would be planning things like this if we were operating in the dead atmosphere of a state controlled economy?"

**Foreign Aid May Mean Less
Steel for Passenger Cars**

A report from Washington says that if the recommendations of the President's committee on foreign aid are accepted, passenger car manufacturers may be among those getting less steel instead of more. The committee urged that highest priority be given to steel shipments for railroad freight cars, which, it said, are badly needed for shipping food and materials for the European Recovery Program. The committee said further that the automobile industry so far this year has been getting steel at the rate of 1,625,000 tons a year above the 1940 level.

**Nash Raises Prices
On All 1948 Models**

Predictions of price increases for automobiles have started to materialize with the announcement that Nash has raised prices on its recently introduced 1948 models. The 600 Series was increased \$42.30, or about three per cent, and the Ambassador line went up \$11.25, or less than one per cent. An unconfirmed report says that the new Hudson line will be about \$40 higher than previous models. C. E. Wilson, GM president, stated a few weeks ago that GM price

increases would range from no increase on some models to as much as five per cent on others. The general opinion in Detroit is that as new models appear they will be accompanied in most cases by price increases, more or less related to the extent of the model change.

Nash reports that it completed the 200,000th postwar car on Nov. 10. The company says that because of materials shortages its plants have been operating at about 50 per cent of capacity.

tages in reducing glare, the manifold problems that would arise during the transition period from present sealed beam lamps to uniform adoption of Polaroid might present hazards and difficulties equal to or greater than the problems now encountered with glare. The position of the industry now is that it has gone as far as it can with technical development, and that the question should be studied for legal and legislative action by the American Association of Motor Vehicle Administra-

**House Moving Made Easy**

Capable of moving houses up to 25 ft in width, the Tournamover, designed by R. G. LeTourneau, Inc., is powered by a Diesel engine developing 214 hp. However, the lifting is done by an induction electric motor energized by an alternating current generator driven by the engine.

**AMA Group Rejects
Polaroid Lighting**

Use of Polaroid lighting for automotive vehicles appears to be still a long way in the future, if it comes at all. At a recent demonstration of Polaroid lighting equipment at the General Motors proving ground, O. E. Hunt, executive president of GM and chairman of the Engineering Liaison Committee of the AMA revealed that the Committee had recommended unanimously that Polaroid lighting not be recommended now for use on automotive vehicles. The recommendation came as a result of a study that has been underway for the past eight years. He said that while the system has many advan-

tors because enabling legislation would have to be enacted in 47 of the 48 states before Polaroid could be adopted.

**K-F Adds Shift to
Boost Production**

Implementing its determination to get production up to 1000 cars a day at Willow Run, Kaiser-Frazer started a second shift on its production line in the body-in-white, paint, trim and final assembly divisions on Nov. 17. The company states that it has now sufficient material commitments to attain the scheduled increase. At the outset, extra shift production will be limited to one assembly line and will be extended to the second line as

NEWS of the AUTOMOTIVE INDUSTRIES

more materials become available. Addition of the extra shift will add 1200 new employes to the K-F payroll, bringing the total to nearly 15,000.

K-F has begun a \$400,000 construction program to expand heating and ventilating systems in the 80-acre Willow Run main manufacturing building. A major project will be installation of a new boiler with 80,000 lb per hr steam capacity to supplement four existing boilers and to increase plant heating capacity by 25 per cent.

A record output of 18,701 cars in October enabled Kaiser-Frazer to increase its profit for the month about 20 per cent to \$5.3 million, according to company estimates. K-F earned a profit of about \$4 million in September.

Pig Iron Supply Critical Because of Scrap Shortage

The pig iron supply is about as critical right now as it has been at any time, according to the best information available. The Packard foundry was required to close at least two days in November because of the shortage. A major cause of pig iron scarcity is the tight scrap supply for steelmaking, and industry sources say that it will be a continuing problem this winter. Consequently, pig iron will have to be diverted into steel making, further complicating the problem for foundries.

Full-Sized \$1,000 Car Remote Says Willys Official

Although a recent survey indicates that 32 per cent of the prospective buyers sampled would purchase a \$1000 passenger car, if such a car were available from a well known manufacturer, a full-sized car selling for that price in today's economy is in the same category as the long departed five-cent glass of beer, according to Arthur J. Weilend, vice president in charge of production for Willys-Overland. He said the whole price level is "way up on the 60th floor, and all of us are there together." He pointed out that in 1940, the automobile represented the price of five tons of beef, whereas today it represents only two tons. In terms of wheat, a car represented 1100 bushels then and only 500 bushels today. Compared directly with real values, he said, the current price of a passenger car appears astonishingly low.

Willys-Overland Motors by mid-November had turned out 100,000

of the 119,000 vehicles scheduled for 1947 by that date. The company had produced 66,567 jeeps, 28,047 station wagons, and 5386 trucks. With the plant improvement program costing nearly \$21 million completed, Willys is planning a production goal of 200,000 units next year. The company has resumed operations at its branch assembly plant at Maywood, Calif., near Los Angeles, idle since 1940.

New Lincoln-Mercury Models May Be Delayed Until April

While new Lincoln and Mercury models are still tentatively slated for introduction in March, it is reported that there is a possibility that the program may be delayed until April. It now appears quite safe to say that the new model Ford will not appear until June.

Fruehauf Trailer to Absorb Carter Interests at Memphis

Fruehauf Trailer Co. has entered into an agreement to acquire all outstanding stock of Carter Mfg. Co., Inc. and Carter Inc. of Memphis, Tenn. The two Carter organizations have 300 employes at the trailer manufacturing plant in Memphis and sales and service branches in Memphis, Nashville and Birmingham. They will continue to operate under present managements. According to present plans, Carter trailers will be

produced at the Memphis plant and serviced at all Carter and Fruehauf branches.

Equip All Chrysler Cars With Super-Cushion Tire

Chrysler has extended the use of the Goodyear Super-Cushion tire as original equipment, effective Nov. 20, to all cars in its line. About three months ago, Chrysler began putting this tire on all of its eight-cyl models. Designated as 7.60-15, the new tire used on Chrysler sixes supersedes the 6.50-15 size.

Crosley Expands Engine And Car Assembly Plants

An expansion program which will increase engine plant facilities at Cincinnati by 21 per cent and the final assembly plant at Marion, Ind., by 40 per cent has been announced by Crosley Motors, Inc., recently. The addition of a Crosley-owned four story building adjacent to its present Cincinnati factory will increase space to 128,000 sq ft, and the new facilities will ultimately permit production of 240 engines a day. The Cincinnati plant is presently producing 140 engines a day. The expansion at the Marion plant will permit boosting output from 120 cars a day to 160 a day.

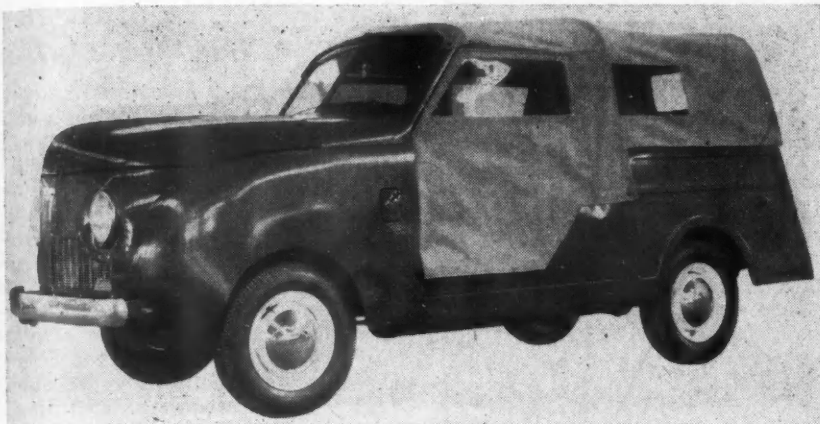
Crosley Motors, Inc., is planning to double the number of its dealers during the next six months. Up to



1948 Crosley Panel Delivery

With about 45 cu ft cargo capacity and capable of carrying 500 lb, the new Crosley two door panel delivery model, a commercial adaptation of the station wagon, is easily loaded by means of a drop-tail door. Interior dimensions are 45 in. in width, 38 in. from floor to roof, and 46 in. from drop-tail door to back of the cab. It has a factory list price of \$899, job, Marion, Ind.

NEWS of the AUTOMOTIVE INDUSTRIES



1948 Crosley Sports Utility

All-weather protection is provided by a fabric top and doors in the new 1948 Crosley two passenger sports utility model which has a truck tail gate and which is adaptable for a variety of transportation jobs. The lowest priced vehicle in the Crosley line, the Sports Utility lists at \$799, fob, Marion, Ind., and provides about 45 cu ft of space for 500 lb of cargo.

the present, the number was limited to 700, but the company now feels that output has been expanded sufficiently to increase the number of sales outlets. Production of Crosley cars has been on the upgrade with 2414 produced in September.

Hudson Nets \$5 Million For First Nine Mos. '47

Hudson Motor Car Co. has reported an increase in net earnings for the first nine months of 1947. Consolidated net income through Sept. 30 was \$5,158,854 compared with \$913,869 for the same period last year.

Keller Plans to Sell Franchises to Dealers

Sale of franchises appears to be the coming method of helping to finance new passenger car companies. Keller Motors, Inc., which plans to produce cars at a war surplus plant near Huntsville, Ala., is planning to raise \$7 million from the sale of 3000 dealerships, and possibly an additional \$10 million through financing. Keller is the successor to the Bobbi Motor Car Corp. and Dixie Motor Car Co.

Form Ford Truck Clubs

In an effort to aid the trucking industry, truck clubs are being formed by truck specialists in Ford dealerships throughout the United

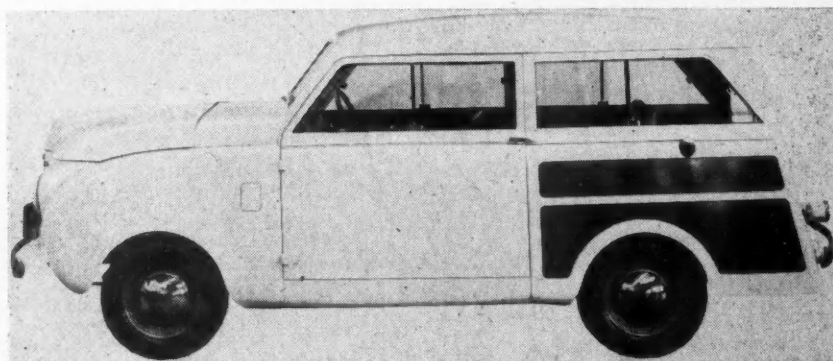
States. Composed of managers and other key men in dealerships, the clubs will concern themselves with all factors affecting freight hauling by trucks. Objectives are to help to win goodwill for the trucking industry through courtesy and safety; to improve the position of the truck driver by establishing him in the same category in the transportation field as a ship's captain or a plane pilot; to study legislation affecting the industry; to look into insurance coverage and rates; to promote uniform lengths and widths; and to investigate all other problems affecting the industry generally.

Douglas Skyrocket For Sonic Research

A new swept-wing sonic research plane, the Skyrocket D-558-2, was revealed recently by Douglas Aircraft Co. Powered by a 3000-lb Westinghouse 24C axial-flow turbo jet engine and a 6000-lb thrust Reaction Motors four-barrel rocket engine, the new aircraft incorporates design features for sonic flights made possible by the combined efforts of the U. S. Navy, Douglas and the NACA. It has a needle-like nose and a 40-deg swept-back horizontal stabilizer mounted approximately in the mid-section of the vertical stabilizer. It has a length of 45 ft 3 in., wing span of 25 ft. and a gross weight of approximately 15,000 lb.

Oil Industry Plans Plants To Make Synthetic Gasoline

Synthetic gasoline derived from natural gas may be available to mid-west motorists sometime in 1950, according to James H. Latta, process design supervisor for the Stanolind Gas and Oil Co. He made the statement following the presentation of a paper before the American Institute of Chemical Engineers at Detroit in which he said that two commercial plants are planned, incorporating the results of five years of intensive industrial research. Mr. Latta said that the synthetic fuels will be marketed through the same distribution channels now used for crude petroleum products and on an equal basis. He predicted that the



1948 Crosley Station Wagon

The latest addition to the Crosley family is the new all-steel, four passenger station wagon. By removing the rear seat, two passengers and a quarter-ton of baggage or cargo can be accommodated. It has a factory list price of \$929, fob, Marion, Ind. It is powered by the four-cyl Cobra engine, developing 26.5 hp, and is 145 in. long, 49 in. wide, and 59 in. high, as are all other Crosley cars.

NEWS of the AUTOMOTIVE INDUSTRIES



General Motors Motorama

Dramatizing fifty years of automotive development, GM's Motorama at the Chicago Museum of Science and Industry was recently opened to the public. Inside the entrance shown here, eight major sections, subdivided into 78 separate units, each tell a part of the history of the development of the passenger car.

fuel will be equal, but no better than present gasolines and that there will be no difference in price. Initial production at the plants will be relatively small at the outset.

General Tire Raises Prices

It appears that higher costs are going to reverse the trend of tire prices which in recent months have

been reduced to a point below the 1941 level. General Tire and Rubber Co. was the first tire producer to break the ice when it announced an increase of 7.5 per cent in the price of all passenger car and truck tires. The action is expected to be followed soon throughout the industry. Generally higher production costs since early summer are the cause of the increase.



Motorama's Hall of Development

Depicting the evolution of automotive manufacture from early, handmade methods to current mass production, the Hall of Development in GM's Motorama emphasizes standardization and part interchangeability. The Dewar trophy, won by Cadillac in 1908 in England for a demonstration of part interchangeability is shown.

Packard Net Loss \$131,478 For First Nine Mos. of '47

The Packard financial report for the first nine months of this year reveals a net loss of \$131,478 after an estimated tax credit of \$1.8 million. For the same period of 1946, net earnings were \$1,387,316 after a credit of \$3,668,000 for tax carry-back. Car production for the first nine months of this year was 39,804, as against 26,555 up to the same time last year. A major cause of Packard's poor showing is the loss of three prewar steel sources which have been sold or absorbed, according to George T. Christopher, Packard president.

GM's Motorama Dramatizes Automotive Development

Always a fertile subject for graphic dramatization, the 50-year history of automotive development is portrayed in GM's Motorama at the Chicago Museum of Science and Industry. Moving from a portrayal of the earliest means of transportation to those employed today, the entire exhibit, which occupies 10,000 sq ft and has 1100 lineal ft of exhibits and displays, has eight major sections, subdivided into 78 separate units.

Major sections include a Theme Room, which starts with the evolution of the wheel and shows the progressive development of the start of the automobile; the Hall of Development shows the development of standardization and interchangeability, Kettering's first laboratory, and a model of the GM Proving Grounds; the Hall of Styling and Engineering details the extent one must go to conceive, develop, engineer, test and produce something different. The Motorama has been officially turned over to the museum by GM.

Car Manufacturers Cooperate With Machine Tool Builders

As part of a continuing program aimed at setting up standards for machine tools, representatives of the various automobile, machine tool, and electrical control manufacturers met recently in Detroit to discuss standards for electrical controls on production equipment. The program was started three or four years ago, and will continue to investigate all elements of machine tools until standards have been adopted.

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Lyman W. Slack Resigns As Packard Sales Chief

In a surprise move, Lyman W. Slack has resigned as director, vice president and general sales manager of Packard Motor Car Co. Mr. Slack did not divulge his plans for the future. He joined Packard in 1934 as sales promotion manager, became general sales manager in 1943, vice president in 1945 and was elected a director in May, 1947. Karl M. Greiner, former parts and service manager, succeeds Mr. Slack as general sales manager.

Pontiac Division Dissolves Four More Distributorships

GM's Pontiac Motor Div. took another step toward elimination of distributors in its sales organization when it dissolved four of its remaining seven distributorships. Each of the distributors retains the status of an individual dealer, and the 46 dealers who formerly operated under them become direct dealers supervised by the factory.

French Automobile Engineers Hold 20th Meeting in Paris

To celebrate its 20th anniversary, the French Society of Automobile Engineers (S.I.A.) organized an engineers' congress, held Oct. 25-28, during the Paris car show. More than 60 papers were presented by engineers from the United States, France, England, Belgium, Italy and Czechoslovakia. Five U. S. papers, two of which were read in French by W. F. Bradley, were presented at this meeting: four as listed on page 47 of the Sept. 15 issue of AUTOMOTIVE INDUSTRIES, and a fifth on the GM high-compression engine by D. F. Caris, R. A. Richardson and W. G. Lowell.

The national museum in the Arts and Métiers Institute had a comprehensive exhibition covering the entire automobile industry. Visits were made to the C.T.A. laboratory, operated in conjunction with the Engineers' Society, and the congress marked the official inauguration of the heat treating laboratory, installed in buildings at Bellevue owned by the National Scientific Research Organization. This new laboratory is believed to be the most elaborate of its kind in Europe, and has been laid out not only for scientific investigation on samples, but for handling small lots on a commercial basis. The national racing car, de-

scribed on page 45 of the Oct. 1 issue of AUTOMOTIVE INDUSTRIES, built under the direction of the CTA, as well as new models shown in the Grand Palais, were presented on Montlhéry race track.

Continental to Sponsor Plane Race at Miami Show

Continental Motors Corp. has announced plans to sponsor an airplane race in the annual Miami All-American air maneuvers Jan. 9-11. Continental will award a silver trophy and \$10,000 in cash prizes to winners in the race, which will be an annual event called the Continental Motors Trophy Airplane Race. According

fied shortly, when import quotas will be established. Importation of component parts will not be affected by the order. Particularly affected are American manufacturers who do not have Canadian operations for building cars. Purpose of the greatly stiffened excise tax is said to be to slow down car production, and to thus conserve dollar balances lost in expenditures for parts in the U. S. The new excise tax schedule is 25 per cent of the first \$1200; 50 per cent of the added value from \$1200 to \$2000, and 75 per cent of the value over \$2000. The excise tax formerly was a straight 10 per cent, plus an eight per cent sales tax which remains unchanged.



Sold to Studebaker

Recently bought by Studebaker for \$3,592,000 from the WAA, this air view of the aviation engine plant at South Bend, Ind. shows the extent of the 960 by 1250 ft manufacturing area. Wartime operator of the one-story building, built in 1940 with windowless walls and air-conditioning, Studebaker has disclosed that operations will not begin for several months.

to C. J. Reese, Continental president, the purpose of sponsoring the race is to stimulate improvement in design of light planes for which Continental is the leading supplier of engines.

80 New Exhibitors At National Motor Boat Show

About 80 firms have indicated their desire to exhibit for the first time at the 38th National Motor Boat Show which will be held Jan. 9-17 in New York.

Canada Bans Car Imports And Raises Excise Taxes

In a move to conserve dollar balances, Canada has invoked an import ban on complete automotive vehicles from the United States, and has clamped stiff excise tax increases on passenger cars sold in that country. The embargo is expected to be modi-

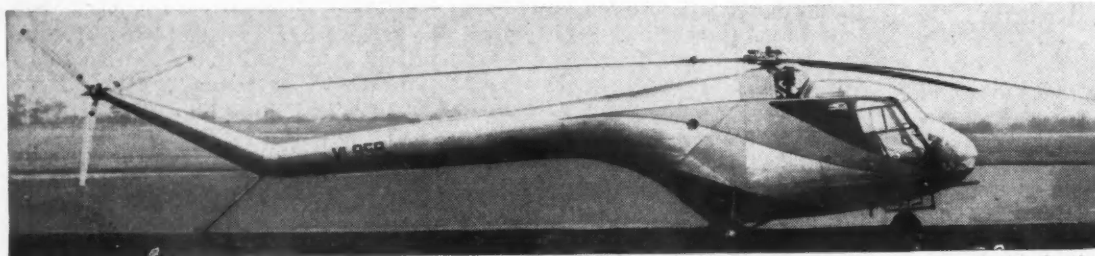
SAE Holds Meeting for Air Transport Engineers

Subjects scheduled for discussion at the SAE National Air Transport Engineering Meeting to be held Dec. 1-3 in Kansas City, Mo., are operating safety, traffic control, airport planning, international standardization, as well as others related to efficient airport and airline operation.

Lincoln Finally Wins Treasury Dept. Bout

In the case of the Treasury Dept. vs the Lincoln Electric Co., the Tax Court has decreed that payments by Lincoln for annuity benefits to its employees and payment to an employees' trust be allowed in full, and that the case be set down for determination of exact tax and fixing of amount of refund to Lincoln. The decision of the U. S. Circuit Court of Appeals, Sixth Circuit, on June 5,

NEWS of the AUTOMOTIVE INDUSTRIES



British Combine

Versatile Bristol

A four place model, produced by the Bristol Aeroplane Co., Type 171 is reported to be Britain's first commercial helicopter.

1947, in this case was reviewed in the July 1st issue of AUTOMOTIVE INDUSTRIES.

New Bantam Car by Toyoda of Japan

A new bantam car has been announced by the Toyoda Automobile Co., Tokyo, Japan. Powered by an engine said to develop 27 hp, the small four-passenger sedan has a maximum speed of 50 mph. The car is priced at 250,000 yen, or about \$5000 at the current official rate of exchange.

Trailmobile Ends Operations At Elizabeth, N. J., Plant

Trailmobile Co. has announced that it has discontinued operations at its Elizabeth, N. J., plant and that the property will be sold. The company acquired the plant two years ago for a trailer assembly plant. Machinery is being dismantled and will be moved to other company plants in Cincinnati, O., Berkeley, Calif., Charlotte, N. C. and Windsor, Ont. Reasons for the move, according to the company, are the failure of foreign orders to materialize as expected, negligible sales, and inability to produce anywhere near the estimated capacity of 20 trailers a day.

Magnaflux Conference On Weld Inspection

Sponsored by the Magnaflux Corp., Chicago, a West Coast conference on weld inspection with Magnaflux and Zyglo will be held Dec. 4-5 in Los Angeles.

SAE Nominees for 1948

The SAE nominee for president for 1948 is R. J. S. Pigott, Gulf Research and Development Co., and for treasurer is B. B. Bachman, Autocar Co. Vice-presidents nominated follow: Air Transport, Wilfred W. Davies, United Air Lines; Aircraft, Arthur L. Klein, California Institute of Technology and Douglas Air-

craft Co.; Aircraft Powerplant, Leslie T. Miller, consultant, Baltimore, Md.; Body, James W. Greig, Woodall Industries, Inc.; Diesel Engine, Harry F. Bryan, International Harvester Co.; Fuels and Lubricants, J. R. MacGregor, California Research Corp.; Passenger Car, A. W. Frehse, Ford Motor Co.; Production, Joseph B. Armitage, Kearney and Trecker Corp.; Tractor & Farm Machinery, George W. Curtis, Timken Roller Bearing Co.; Transportation and Maintenance, Warren A. Tausig, Burlington Truck Lines, Inc.; and Truck and Bus, Dale Roeder, Ford Motor Co. Nominated for membership on the SAE Council, term of 1948-1949, are F. W. Fink, Consolidated Vultee Aircraft Corp.; P. E. Hovgard, Piasecki Helicopter Corp.; and Elbert E. Husted, Titeflex, Inc.

Firestone Survey Shows Good Repair Parts Market

As a result of a comprehensive economic study recently completed by Firestone Tire and Rubber Co., Firestone predicts that prospects for tire dealers and service station business for next year are excellent. The survey pointed out that the number of passenger cars on the road is increasing steadily, resulting in a

very high level of demand for tires, batteries, spark plugs, brake linings, gasoline, oil and other automotive supplies and accessories. Approximately five million more passenger cars two years old and over are on the road today than were in use in 1941, and because of increasing age require more maintenance repair and service, the company pointed out. A recent Census Bureau estimate showed that there now are fewer service stations operating than there were before the war, despite the greater need for maintenance.

NAM Industry Congress In N. Y. C. on Dec. 3-5

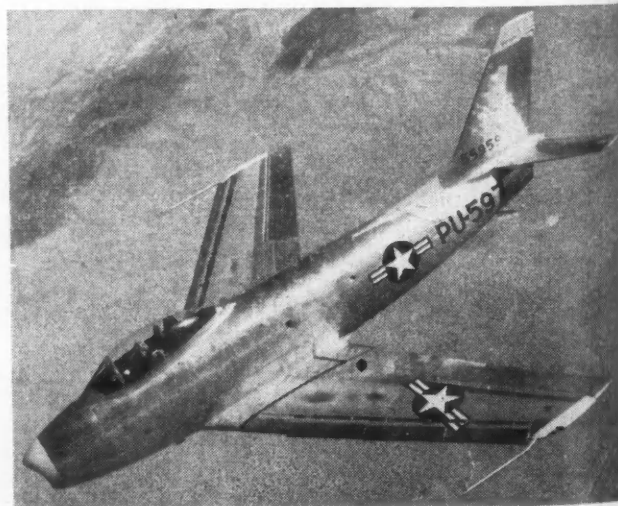
The NAM's 52nd Congress of American Industry will be held Dec. 3-5 in New York City. Starting with a morning session on Dec. 3, the program carries forward with prominent speakers scheduled for luncheon, afternoon and evening sessions, and concludes with the annual dinner on the evening of Dec. 5.

Elect A. G. Bryant President of NMTBA

Alexander G. Bryant, vice-president, Cleerman Machine Tool Co., Chicago, and Green Bay, Wis., and president, Bryant Machinery & En-

XP-86

Swept-back wings mark the U. S. Air Force's jet propelled XP-86, built by North American Aviation, Inc., which is designed for speeds over 600 mph. Powered by a G-E Allison J35 (TG-180) axial flow jet engine producing 4000 lb of thrust, the plane, featuring a super thin wing, spans 37 ft, has an overall length of 37 ft, and a height of 14 ft.



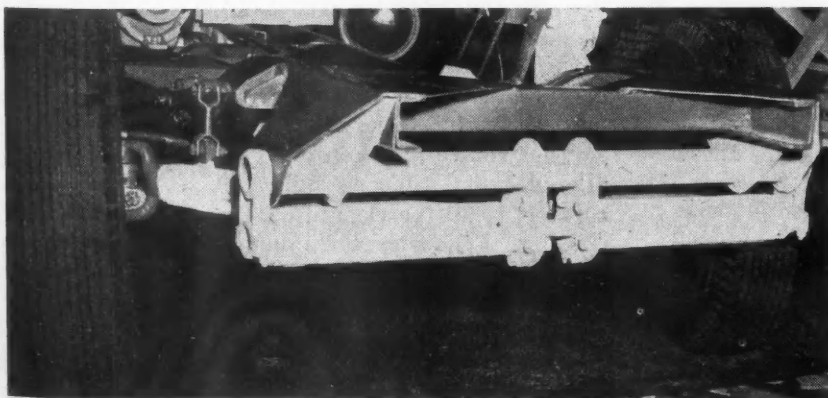
NEWS of the AUTOMOTIVE INDUSTRIES

gineering Co., Chicago, was elected president of the National Machine Tool Builders' Association at the fall meeting in Hot Springs, Va. Lloyd D. McDonald, vice-president, Warner & Swasey Co., Cleveland, was elected first vice-president; and David Ayr, president, Hendy Machine Co., Torrington, Conn., was elected second vice-president. Louis Polk, president, Sheffield Corp., Dayton, O., was reelected treasurer; Frida F. Selbert was reelected secretary; and Tell Berna was reappointed general manager. New directors elected were: David Ayr; Harold B. Smith, president, Illinois Tool Works, Chicago, and M. A. Hollengreen, executive vice-president and general manager, Landis Tool Co., Waynesboro, Pa.

Labor

GM of Canada Completes New Contract with UAW

GM of Canada has completed a new contract with the UAW-CIO covering 4500 employees in Windsor and Oshawa, Ont. The contract includes the Rand formula, providing for the dues check-off for all workers in the bargaining unit whether they are union members or not. The Rand formula came into effect during the Ford of Canada strike, and is based on the premise that since all workers benefit from gains obtained by the union, all should contribute to supporting the union. Special assessments, however, cannot be levied against non-union members.

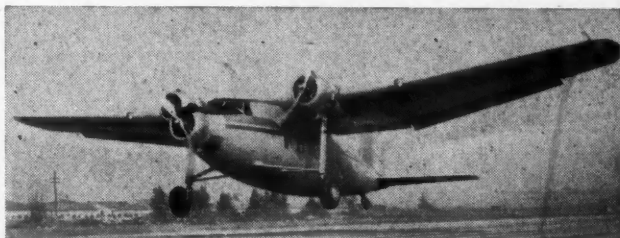


Keller Cradle

The front end of the stripped chassis of the new Keller Super-Chief passenger car shows the B. F. Goodrich Torsilastic spring used to give individual suspension to all four wheels. The spring's main element is the lower steel and rubber cylinder, while the torsion arm of the right front spring is seen at left, slanting backward and outward to the wheel.

Flying Pioneer

Shown flying at Hawthorne, Calif. Northrop's N-23 Pioneer, designed for short and medium haul operations, is an all-metal, three engined plane.



Reuther Victory Bolsters Drive for Economic Gains

Reaction to the overwhelming victory of Walter Reuther in the UAW-CIO in sweeping the alleged Communist-dominated officials out of the top union staff has met with mixed reaction in Detroit. All concerned are happy to see the defeated officials go, but have very definite reservations that the move will mean any less trouble for the car and truck industries. One of the first acts of the new executive board was to comply with the non-Communist provision of the Taft-Hartley Act. One thing is certain to result from Mr. Reuther's victory—he now will increase his vehemence in pursuit of economic goals which include employer-financed health and hospitalization insurance, a guaranteed work week of 40 hours, adequate pension plans and industry-wide bargaining. He already has stated that one of his first moves will be to ask automotive manufacturers to set up an industry council under which labor and management will jointly form the economic policies of the industry.

Metals

Lead

Short supply characterizes the lead market with producers reporting inability to meet consumer requirements in full. The expectation is that the current market situation will carry forward to the first quarter, and there is considerable speculation about the market effect of a government procurement program, made necessary because of inability to meet stockpile requirements.

Zinc

Both Special High Grade and Prime Western are tight, but consumers are generally able to fill their zinc demands. Some searching, however, is necessary in order to obtain either of the two former grades. The American Zinc & Chemical Co. is closing its plant at Langeloth, Pa., with zinc production ending at the end of November.

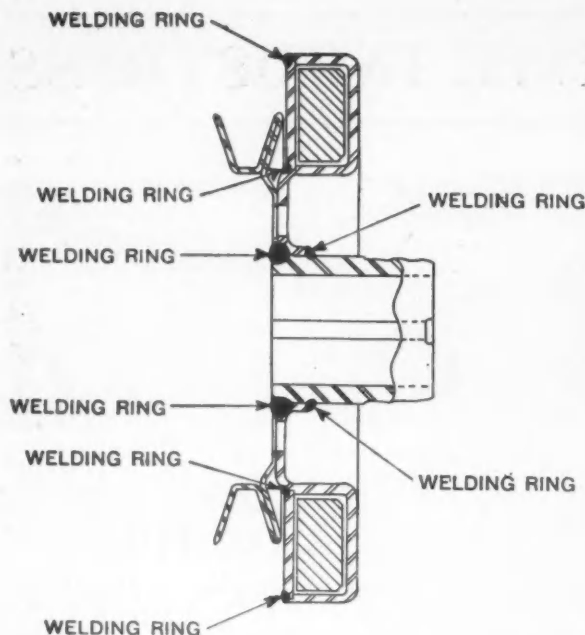
Cadmium

Although cadmium is not plentiful, cadmium consumers are obtaining what they need. Both cadmium exports and purchases for the permanent stockpile are contributing market factors.

North American Leases WAA Facilities at Long Beach

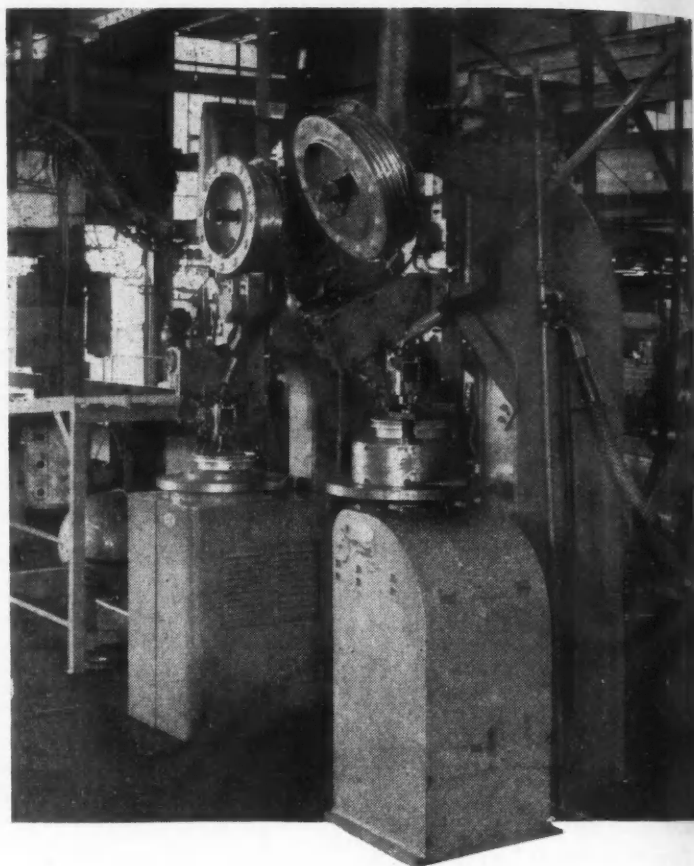
Five units of the government-owned Douglas Aircraft Co., Inc., plant at Long Beach, Calif., have been leased for five years by North American Aviation, Inc., the WAA has disclosed. The annual rental is \$226,508.29, payable monthly in advance, and North American will pay all taxes, insurance, maintenance and utility costs. The property leased includes about 26 acres of land, 10 buildings and provides about 422,000 sq ft of floor space.

(Turn to page 88, please)



(Above) Cross-sectional view of typical damper for passenger car engines of moderate displacements. The pulley and hub are varied to suit the requirements of a specific engine. (According to a recent Packard announcement, this type of damper has been adopted for its 288 Eight engine and for the Packard Six.—Ed.)

(Right) Here are two of the special seam welders of submerged-arc type used on the Houde damper line.



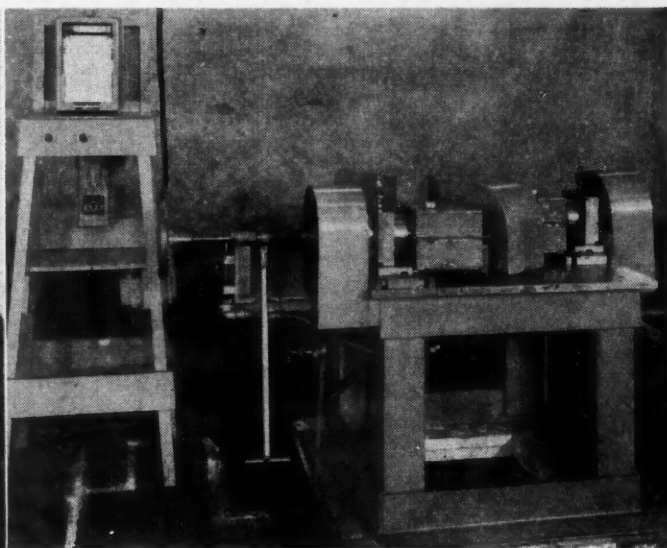
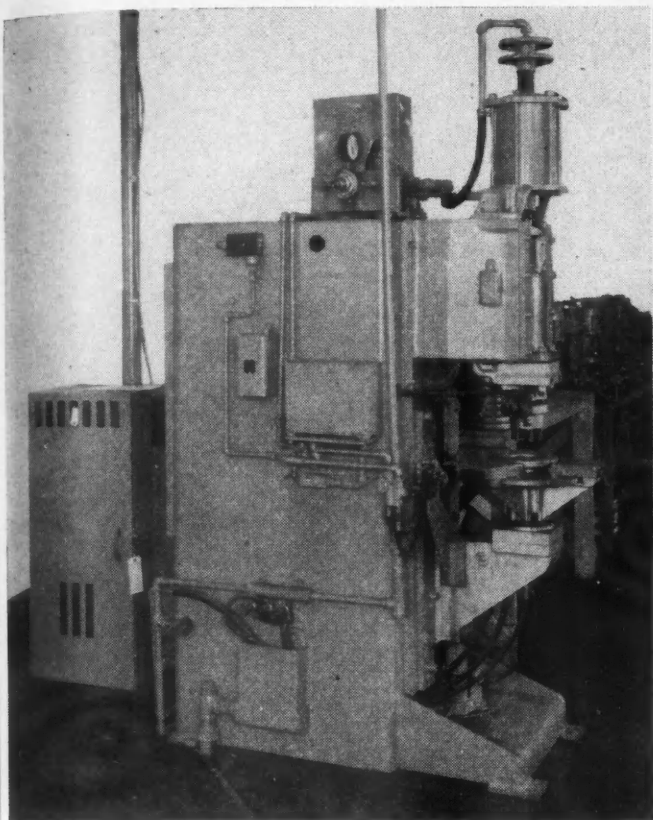
Welding Facilitates Assembly of Silicone Engine

THE unique viscous torsional vibration damper introduced some time ago by the Houde Engineering Division, Houdaille-Hershey Corp., was designed originally for application on large Diesel engines and produced in relatively small lots for a variety of makes and models. In recent months, however, this type of damper has been adapted for small automotive engines and particularly for popular makes of passenger car gasoline engines. Consequent standardization of the range of damper size coupled with large production quantities has led to the development of a compact mass production department in which the smaller dampers can be manufactured rapidly and at the greatest cost saving.

That the viscous damper is not a complex mechanism may be noted by examining the cross-section of a typical automotive unit reproduced here. It consists of the housing (a steel stamping held to closer than

normal tolerances), the flywheel, the cover (a steel disk), and a hub and pulley suitable for a specific make of engine. The magic-working medium ingredient, not visible in the drawing, is the small volume of high-viscosity Silicone fluid which is metered accurately to fill the clearance between the flywheel and housing. Following machining of the component parts, they are cleaned in a large mechanical washer and are ready for the assembly operations to be described here.

The first step is the metering of the Silicone fluid into the housings. This operation is handled in an automatic filling machine having a multiplicity of stations to speed productivity. The operator simply loads and unloads the fixtures. After the housing has been removed from this machine the operator at the next station inserts the flywheel and positions the cover. The latter is then pressed in place in a hydraulic press. It may be noted at this point that the flywheels have



(Above) Each finished damper assembly is tested for damping effect in this special machine having a mechanical drive in the center.

(Left) This is the projection welder for welding the pulley to the housing.

By Joseph Geschelin

Dampers

been cadmium-plated all over in a large automatic plating machine built for the purpose by Udyllite. The purpose of the cadmium plate is to provide a bearing surface more compatible with the special lubricating properties of the Silicone fluid.

Next in line is the submerged arc welding of the outer and inner edges of the cover to the housing. These operations are performed in separate steps on special submerged arc welding machines. The resulting weld is clean, smooth and almost flush with the work, features deep penetration and freedom from porosity. Following welding the housing goes to a special test fixture where the quality of the weld is tested under 80 psi air pressure to assure freedom from leaks.

The pulley now is assembled to the housing in a welding fixture and projection welded at six points in an automatic projection welding machine. This, in turn, is followed by pressing-in of the hub and weld-

ing the hub to the housing. This is a continuous submerged arc weld, producing a deeply penetrant weld which joins both the housing and pulley web to the hub. The assembly then is reversed to permit submerged arc welding of the hub to the housing on the side opposite to the pulley.

Upon completion of the series of welding operations, the assembly goes through a number of machining steps, including—facing welded end of hub to insure flat surfaces for mating parts; broaching the hub bore and cutting the keyway in one setting in a large vertical hole broaching machine; milling and burring the slot in the hub; and milling of the timing mark.

Finally the assembly is run in a special machine to assist the spreading of the Silicone fluid over the working surfaces of the flywheel and housing. Each assembly then is tested for damping effect in a special test machine illustrated here. As shown, the machine consists of a mechanical drive in the center with large universal joints mounted angularly at each end. The object of this arrangement is to produce forced resonant vibrations at the terminal ends, the unit to be tested being mounted at one terminal and a compensated and calibrated dummy at the other. The desired damping characteristics are measured in terms of increased power input requirement to offset additional work done. Translation is from readings on a recording watt-meter.

Accepted dampers are balanced on a dynamic type vertical spindle balancing machine. It should be noted at this point that the flywheel has been balanced after machining so that actually the unit is subjected to two separate stages of balance—first the flywheel alone, then the entire assembly. Finally, the dampers are washed, painted and packed for shipment.

French Try Comeback

Many New Designs Displayed for

First Time at Paris Automotive Show

By W. F. Bradley,

European Correspondent for AUTOMOTIVE INDUSTRIES

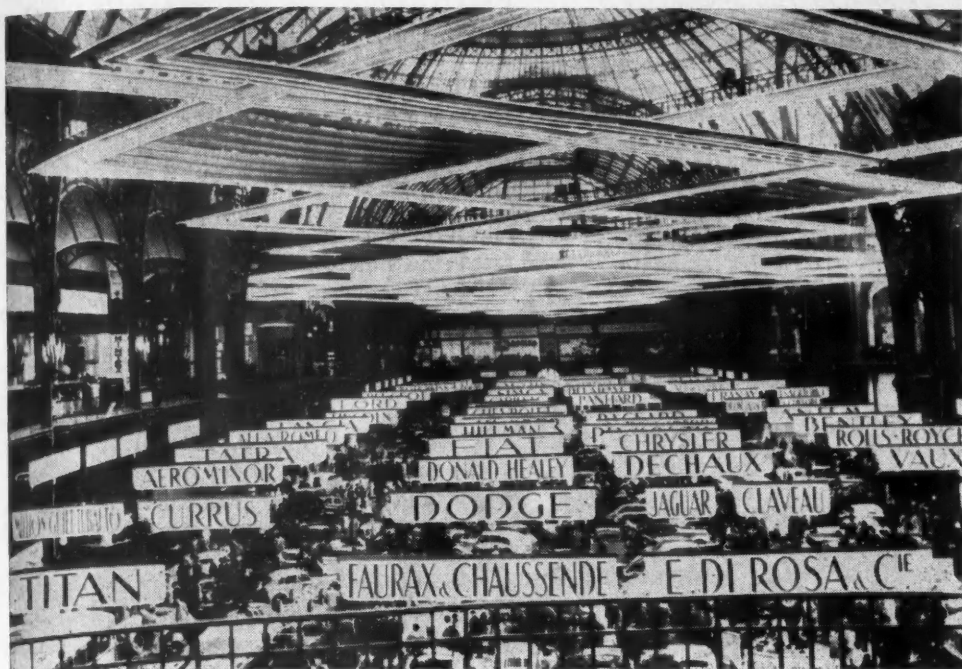
PARIS—This year's Annual International Automobile Salon at the Grand Palais, the 34th held in Paris, featured more than 900 entrants from France, Great Britain, Italy, Czechoslovakia and the United States, and overflowed into an annex for trucks and utility vehicles.

For the French automobile industry, the 1947 Salon was an exposition rather than a market, because French manufacturers are, in most instances, still unable to take orders. Last year, several new models were presented at the Salon, although most of them were far from the production stage. During the intervening twelve months some progress has been made. Renault, for instance, is fully tooled up, and has installed automatic transfer machines for the production of a four-cylinder, rear-engine rear-drive model which was accepted under the national program at the end of 1945. State-owned, the Renault organization is operated as an industrial establishment under a general manager appointed by the Ministry of Industrial Production in agreement with the Ministry of National Economy. The staff, which had fallen to about 13,000 when taken over by the State in October 1944, now numbers more than 35,000, which is almost the prewar figure. The commercial privileges which, according to rivals, Renault enjoys as a State organization, do not prevent the management protesting against the short allocation of raw material. The program for the rear engine model is 300 per day. At the present time the production is 100 Juvaquatre (a prewar model), 24 light trucks, 45 one-ton trucks, 35 two-ton trucks, 10 seven-ton trucks, four coaches, and 12 agricultural tractors. In addition, spare parts for all vehicles are being produced on a bigger scale than before the war, and tire production is at pre-war level.

Citroen has made no change in its production program, continuing to produce two front-wheel drive models, one with four and the other with six cylinders, and in addition having a well-developed truck program. It is an open secret that Citroen has a small car ready for production, but is not allowed to produce it under the national scheme which requires manufacturers to take their orders on technical development from the Government. Peugeot, the third of the big three, had a new model ready, but because of production difficulties decided not to present it this year.

The French Fiat, high on the list of numbers of cars built, has transformed its "500" two-seater model, making it the Simca Six instead of the Simca Five. With bore and stroke unchanged, the new model has overhead valves with pushrods and rockers. The radiator is behind the engine with fan driven by belt and pulley, the shaft going through the overhead valve cover. The independent front suspension has undergone little change, but half elliptic springs are used at the rear in place of quarter elliptics, and the spare wheel is inside the body behind the seats, instead of being outside. Instead of a gravity-feed gasoline tank, a pump-feed tank at the rear is now used. The 34.7 cu in. engine develops 16 hp; brakes are Lockheed and have a diameter of 7.8 in.; and tires are now 4.25 by 15. Since it was first produced in the Fiat factory about 1937, this two-seater model has met with considerable success in different European countries. It is interesting to note that, while the French firm has modified the original design, the Italian company has made no change. It is reported that when it does come, the change will be of a much more drastic nature.

Fanhard is now tooled up for production of the Dyna model (see AI—April 1, 1947), a front-wheel

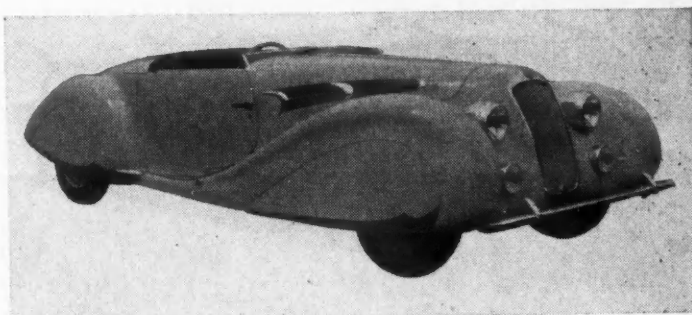


This general view of the 34th International Automobile Salon, Grand Palais, Paris, shows the exhibitions arranged under an unusual pattern of modernistic lighting fixtures, running the entire length of the spacious Palais. (International News Photo.)

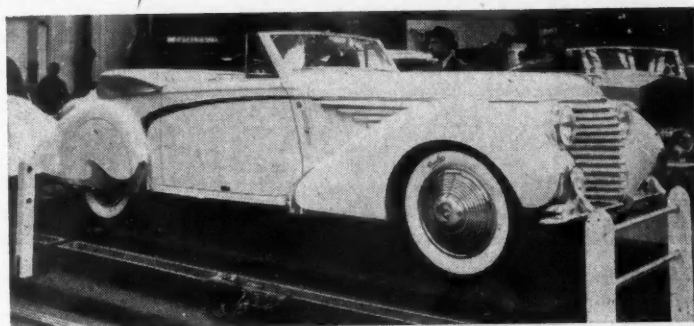
drive air-cooled flat twin, with independent suspension. Light alloys are used in the power plant, but the frame members are steel. An aluminum panel body is provided also.

Last year J. A. Gregoire produced a light alloy air-cooled flat twin which, it was announced, would be built in France by the Fiat Co. and in England by Grantham Productions. Both these plans have failed to materialize, and Gregoire is now showing a five-passenger car powered with a water-cooled flat four mounted in a light alloy chassis-body. Weighing 2094 lb, this model has a wheelbase of 97 in. and a tread of 55 in. The main elements of the chassis are: the dashboard and windshield frame, weighing 99 pounds; the forward support which is bolted to the dash and carries the engine and attachment for the suspension, weighing 26 lb; the forward frame members, the two weighing 40 lb; and the two rear frame members weighing 22 lb. The members are bolted together, giving a very rigid chassis to which the body is attached, total weight of this frame being 209 lb.

Engine and transmission of the Gregoire are a single unit for driving the front wheels. The horizontally-opposed cylinders have a bore and stroke of 3.38 in., giving a piston displacement of 122 cu in. Compression ratio is 6.5 to 1 with output of 64 hp at 4000 rpm. Crankcase and cylinders are in light alloy, the latter having wet liners. An aluminum head is used, with valve seats in bronze-aluminum, valve guides in cast iron, and push rods in duraluminum with steel ends. There is a radiator for each bank of

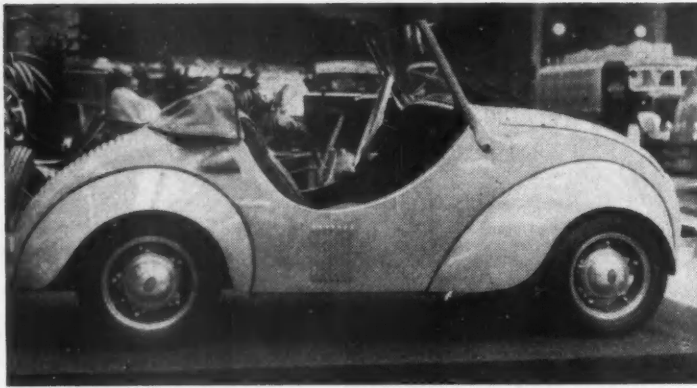


French-style Delage D-6 roadster.

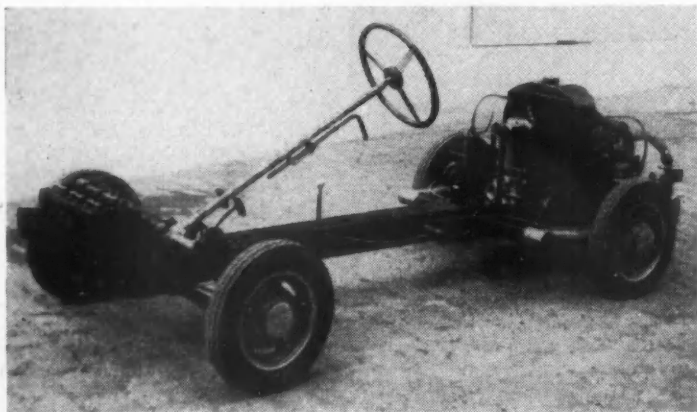


French Delahaye, styled by Frannay.

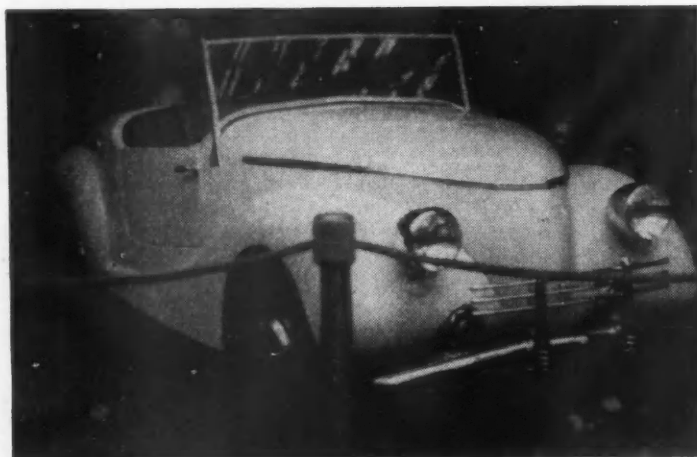
two cylinders, with a belt-driven turbine drawing in air and carrying it through two branches of an aluminum tunnel direct to the respective radiators. No air, of course, is passed over the engine. This has been done not only to improve cooling, but to reduce head resistance. Laboratory tests have shown that the normal 15 per cent loss by passing air through the radiator is reduced by half. The transmission



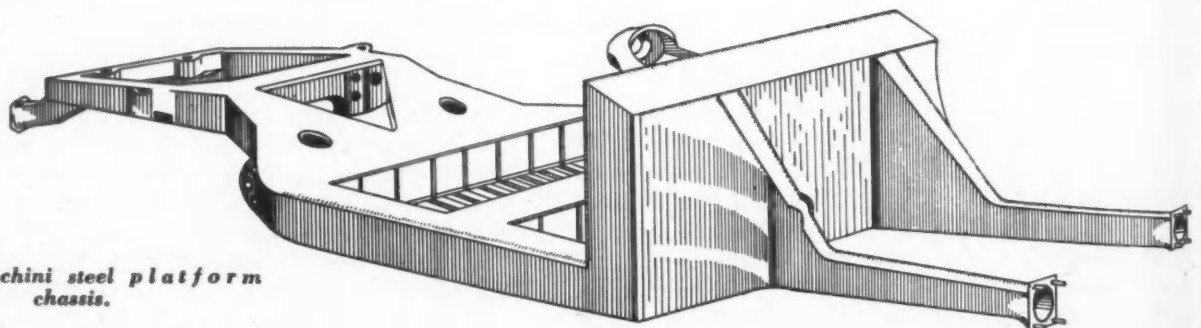
The two-hp Rovin, smallest of the new French cars, is reported to have a speed of about 37½ mph and a fuel economy of over 73 mpg. The two-cylinder horizontally opposed engine is mounted in the rear.



This photo shows the Rovin chassis, with the rear-mounted engine and the unusually large battery at the front.



The French Boitel, a three-hp two-seater with the engine in the rear.



Isotta Fraschini steel platform chassis.

comprises four forward speeds with direct on third, the fourth being an overdrive with a ratio of 0.764 to 1 compared with 1 to 1 for third gear ratio.

On the earlier Gregoire front wheel suspension was by a pair of semi-elliptic springs (see A I—Jan. 15, 1946). This has been changed to a pair of supporting arms in duraluminum with a coil spring slightly inclined from the horizontal. At the inner end the spring is attached to the front support and at the outer end to the outer end of the upper arm, the system giving variable flexibility. In principle the same type of suspension is used at the rear. Each wheel is mounted on a heat-treated light alloy arm, pivoted on the rear frame member. Mounted almost horizontally, length and flexibility are adjustable, and the design provides varying flexibility. A torsion bar is used as a stabilizer. Wheels are light alloy with cast-in iron liners, brakes being nine in. by 1.9 in., with Lockheed control. Maximum speed is 90 mph and gas consumption at an average speed of 50 mph is stated to be 28 miles to the U. S. gallon. Wind tunnel tests on one-tenth models gave a favorable Cx figure of 0.20, as compared with 0.43 for what may be considered a modern streamlined car. These tests showed that the air normally passing through the radiator and over the motor represents one-seventh of the total resistance.

A year ago Georges Irat produced a chassis-body built up of cast magnesium-alloy elements bolted together, this framework receiving sheet alloy paneling. So far as mechanical elements were concerned, there was no innovation, the engine being in front and a normal rear axle being used with semi-elliptic springs. Uninterrupted road tests during the past year have shown that this type of chassis-body is satisfactory, there being no tendency for the elements to work loose, a reduced number of big diameter assembly bolts giving better results than a larger number of small bolts. A high degree of rigidity is obtained

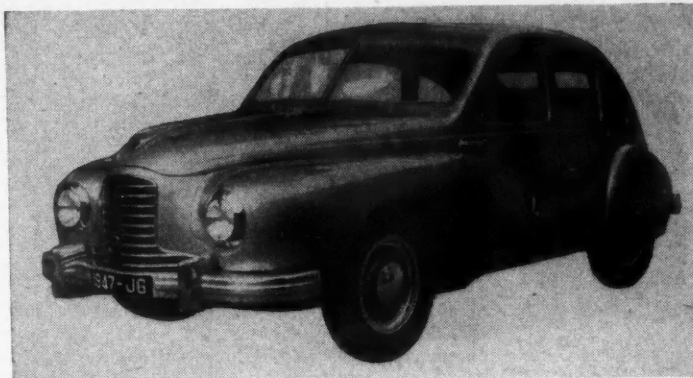
with a substantial reduction in weight.

The latest model Irat is a sports car with a vertical four-cylinder light-alloy engine of 3.31 by 3.54 in. bore and stroke, nitridin cylinder liners, alpax spherical head with valves at 60 deg, two overhead camshafts with chain drive, a compression ratio of 7 to 1, and a feed and a scavenging oil pump. Total weight of the car, which has three seats abreast and baggage compartment behind, and wheelbase of 102 in. and tread of 52 in., is stated to be only 1650 lb.

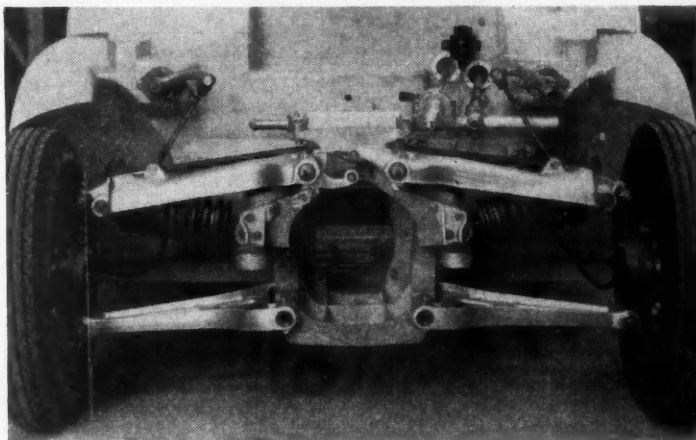
Another car shown for the first time last year was the Claveau V-eight, also a light-alloy job throughout. This has not yet reached the production stage, but the engine was taken off the bench and placed in the show, revealing the hydraulically-operated valves, a Claveau patent. The car has front-wheel drive, five-speed transmission (overdrive on fifth) and independent suspension on all four wheels.

A part of the official French industrial program is the production of small, inexpensive two-seaters which will take a place below that of the four-passenger autos of the Renault rear engine type. Production on these miniature cars does not appear to be under way as expected. The only model which appears to be in full production is the De Rovin, now being built in the former Delaunay-Belleville factory. Whereas a year ago De Rovin favored a single-cylinder air-cooled engine at the rear, the present model is a water-cooled L-head flat twin with rear mounting. The engine has a piston displacement of 26 cu in., and a three-speed transmission with drive to the rear wheels by transverse Cardan shaft. While aluminum alloy is used for crankcase, cylinder head, transmission housing and water pipes, as well as for the wheels, the combined chassis-body is welded sheet steel.

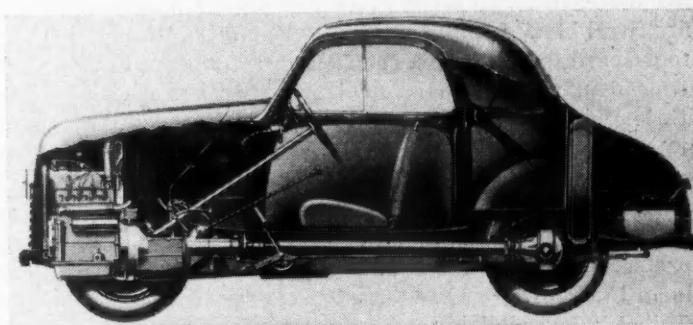
There were several miniature cars in the show, practically all of them having a rigid, welded sheet-steel chassis-body to which a power plant is affixed either front or rear.



New design of the French Gregoire. This five-passenger car is powered with a horizontally-opposed four-cylinder engine, and has a front-wheel drive.

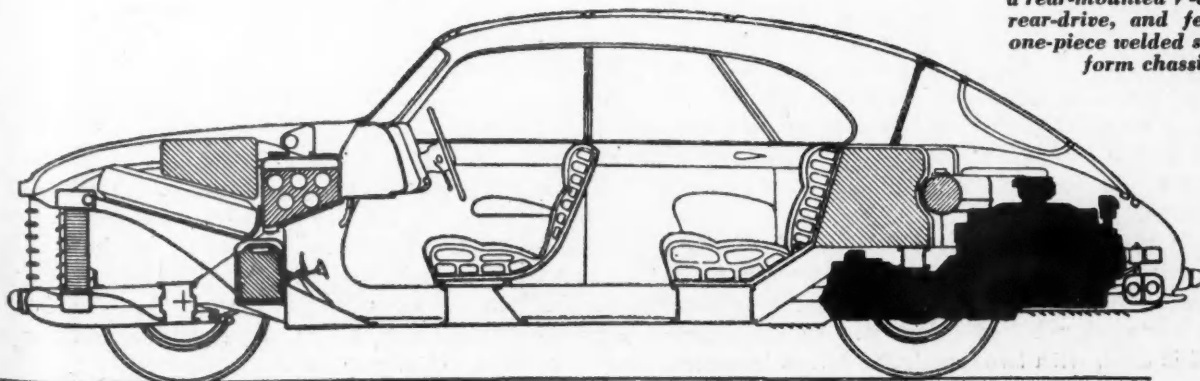


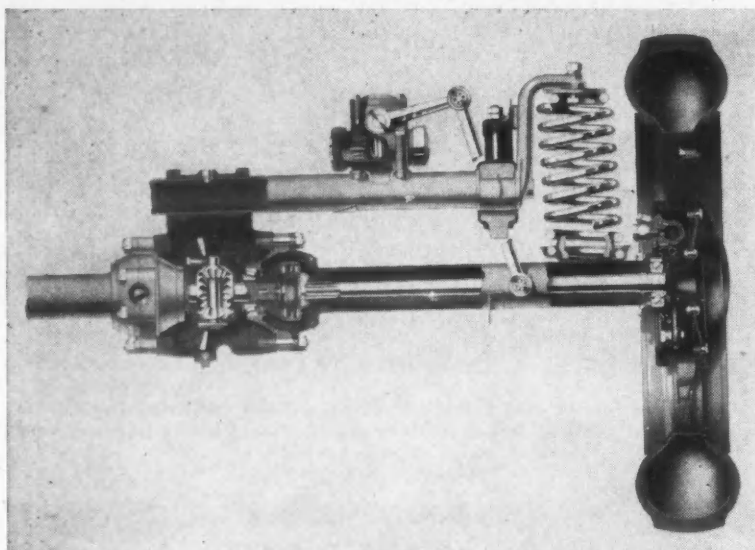
Unusual front suspension of the Gregoire.



Cut-away view of the new French-built Fiat.

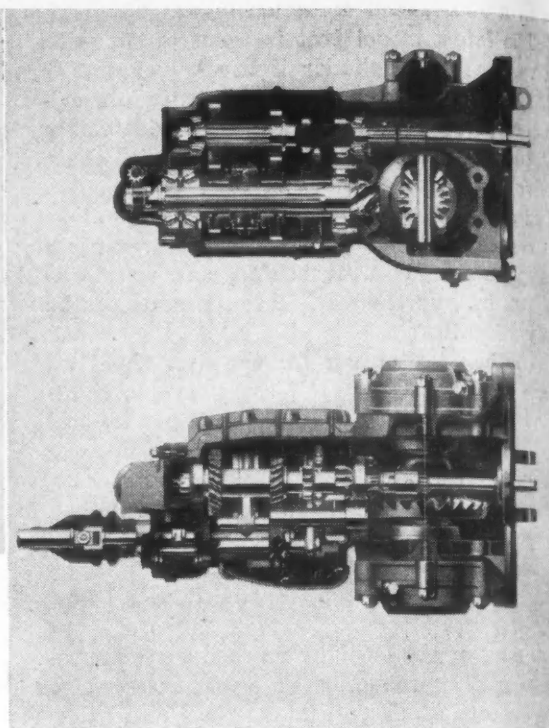
(Below) Cut-away drawing of the Italian Isotta Fraschini. This new model has a rear-mounted V-8 engine, rear-drive, and features a one-piece welded steel platform chassis.





(Top) Mechanical details of the suspension and rear drive of the rear-engine Renault are shown in this cut-away photo.

(Left) Transmission and differential details of the rear-drive rear-engine Renault are shown here in longitudinal side (upper) and longitudinal top (lower) cut-away views.



While many of the details are ingenious, it remains to be seen whether these small cars will have more than a local appeal.

A newcomer was the Dolo, presented in two models, one having a flat four engine of 2.28 in. bore and 2.20 in. stroke, and the other a flat eight engine of the same dimensions. Both engines are air cooled by a centrifugal blower, and have front-wheel drive through a four-speed transmission, the fourth being geared up. Independent suspension is applied to the four wheels with longitudinal torsion bars in front and transverse bars at the rear. Body and chassis are a one piece construction in electrically welded light alloy. Externally a feature of this car is a Plexiglas dome for the body, giving complete visibility in all directions. As a protection against the sun, there is an internal curtain in the roof.

Talbot is specializing on a sports chassis, with a six-cylinder overhead valve engine of 3.66 by 4.33 in. bore and stroke, two camshafts, valves at 45 deg operated by pushrods and rockers. Power output is declared to be 170 hp at 4200 rpm. Front suspension is by a transverse spring, with upper arm attached to the top of the frame member. A telescopic shock absorber is attached to the linkage of the outer extremity of the spring and, passing between the two suspension arms, is secured at its upper end to the bracket carrying the pivot for the suspension arms. The outer arm is extended to receive a link connecting to a friction type shock absorber set across the front of the frame.

Bugatti's latest production is a four-cylinder supercharged racing engine of 91½ cu in. displacement. The Roots-type blower is in front, driven off crankshaft, with the carburetor bolted below it. An aluminum alloy head is used, with two camshafts driven by gears

in front. It is doubtful if these engines can be produced at an early date, owing to the death of Ettore Bugatti and the time necessary to re-equip the factory.

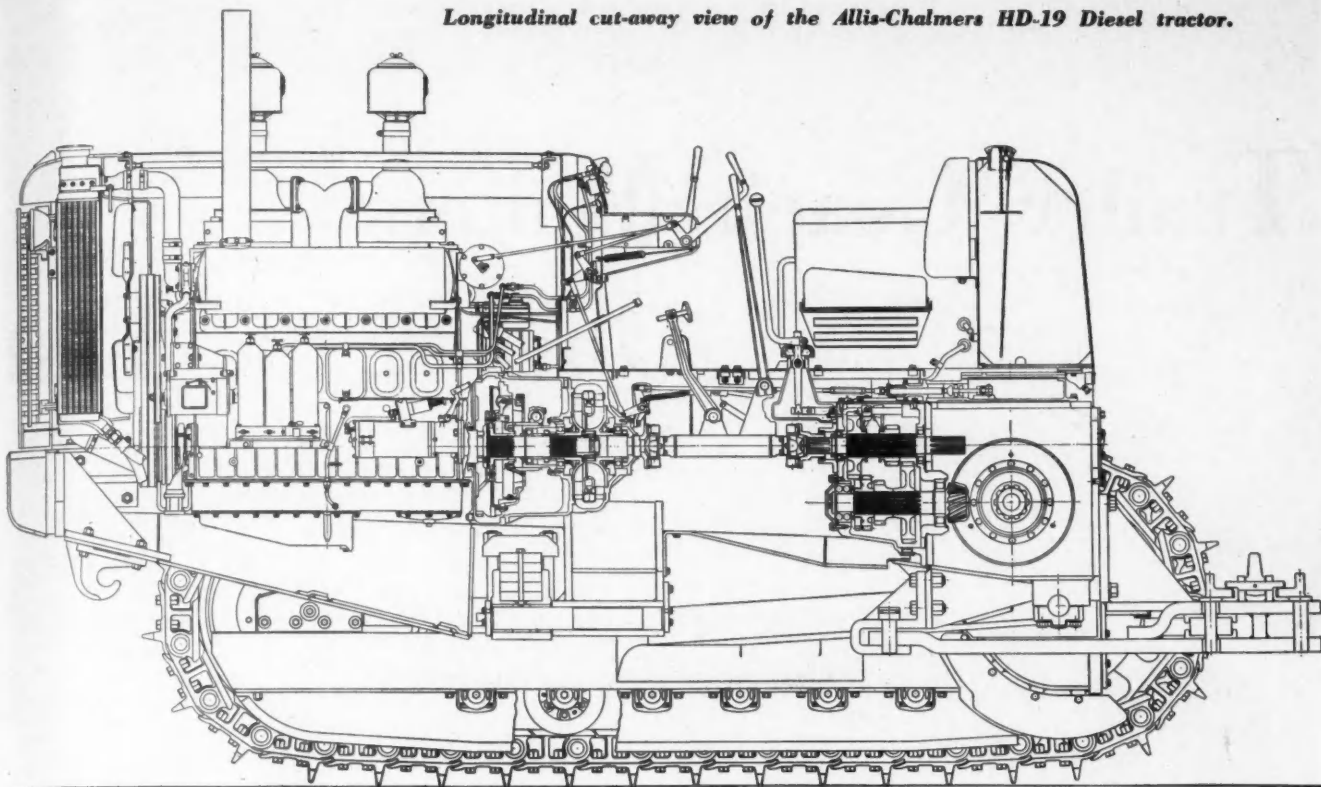
A distinctive note has been struck by the Italian manufacturers, admitted to the Paris show for the first time this year. Built to the designs of Engineer F. L. Rapi, who for a number of years was responsible for Fiat technique, the Isotta Fraschini Company has come forth with a rear-engine, rear-drive V-eight model featuring a one-piece welded-steel platform chassis with rubber suspension all around. This interesting chassis emphasizes the European tendency towards a grouping of all the driving elements either at the front or at the rear, and as a corollary the abandonment of the normal type of frame with longitudinal members united by transverse or diagonal members, or both.

The Isotta Fraschini frame is narrowed in front and rear for the wheels. It is claimed that, with equal weight, the rigidity of this construction is two to three times greater than that of the normal chassis. It was stated that the frame alone weighed 220 lb; the frame with body, 660 to 770 lb; and the complete chassis 1980 lb. This is a full-size car with a wheelbase of 122½ in. and a tread of 57 in.

The power plant of the Fraschini is a light-alloy V-eight of 207 cu in. displacement developing 125 hp at 4200 rpm. Valves are in the head, with hydraulic tappets, and spark plugs are also in the head, completely enclosed, access to them being by means of a detachable cover plate. All ignition wiring is enclosed. At the front are two water pumps, one for each bank of cylinders, built-in with the casting, and a pulley on a shaft running through the angle formed by the banks of cylinders, driving the generator off

(Turn to page 62, please)

Longitudinal cut-away view of the Allis-Chalmers HD-19 Diesel tractor.



Specifications of Allis-Chalmers HD-19 Diesel Tractor

Speeds and Drawbar Pulls

Low	0 to 2.0 mph	36,000 lb*
High	0 to 7.0 mph	28,000 lb*
Reverse	0 to 5.5 mph	36,000 lb*

Engine

Make	General Motors Diesel
Type	Two-Stroke
Net Engine Power at Flywheel	163 hp
Bore and stroke	4 1/4 in. by 5 in.
Number of Cylinders	6

General Dimensions

Overall length	190 1/2 in.
Overall height (without stacks)	87 13/16 in.
Overall width	109 1/4 in.
Ground clearance	16 1/2 in.
Drawbar height	19 1/2 in.
Lateral drawbar movement	44 in.
Shipping weight (approx.)	40,000 lb

*Maximum drawbar pull in first and reverse gear computed as 90 per cent of tractor operating weight or point at which track slippage occurs on average footing. Mounting of allied equipment on tractor (bulldozer, etc.) will increase maximum drawbar pull in 1st gear up to 90 per cent of weight of added equipment.

New Diesel Tractor

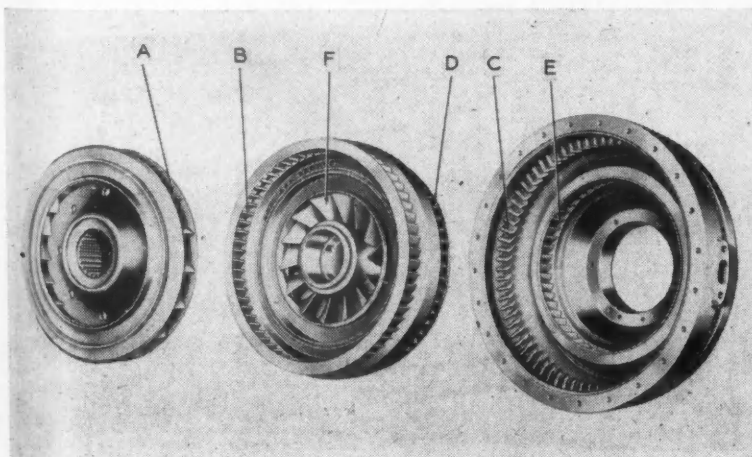
PRODUCTION of the Allis-Chalmers HD-19 Diesel, claimed to be the world's largest and most powerful crawler tractor, is now under way at the company's Springfield, Ill., works. Completely new throughout, this tractor is equipped with a three-stage hydraulic torque converter for increased work capacity and better performance. It is stated that application of the liquid-drive principle permits horsepower output of the engine to be held constantly near the maximum, eliminates shock loads on the tractor, and reduces both breakage and wear of the vehicle and allied equipment.

Operating adjustments, maintenance points and major assemblies of the HD-19 are located so that maintenance and repairs can be accomplished, Allis-Chalmers states, with a minimum loss of time and effort. Positive-seal grease-packed truck wheels, idlers and support rollers are serviced at the factory, and thereafter require greasing attention only once every 1000 hours.

Factors attributing to improved operator comfort include an adjustable seat, hydraulically powered steering levers, adjustable brake pedals, self-energizing brakes and a large clear operator platform. Another feature of the new HD-19 is the A-frame track stabilizer design which is claimed to eliminate twisting strains and to provide track alignment. Other details of the Diesel tractor are given in the accompanying table of specifications.

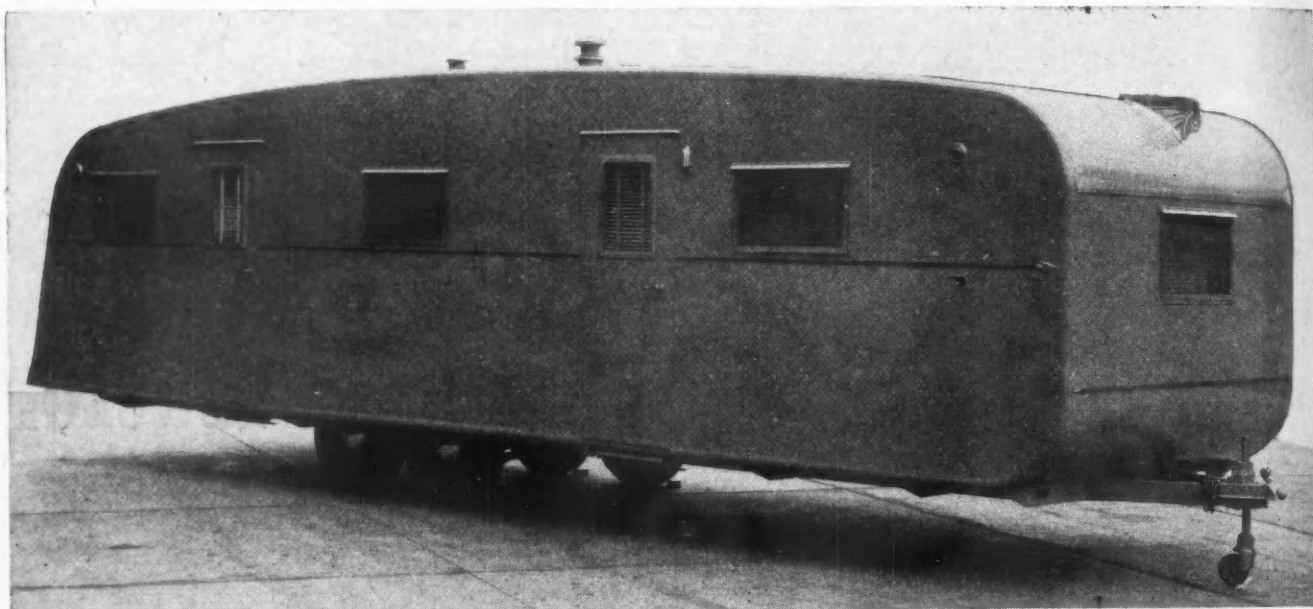
Three-stage torque converter in the Allis-Chalmers HD-19 Diesel tractor.

At A is the impeller or driving member, B is the first set of blades on the turbine wheel, C the first set of reaction blades, D the second set of driven blades, E the second set of reaction blades, and F the third stage or set of turbine wheel blades.



Trailer Coach Makers

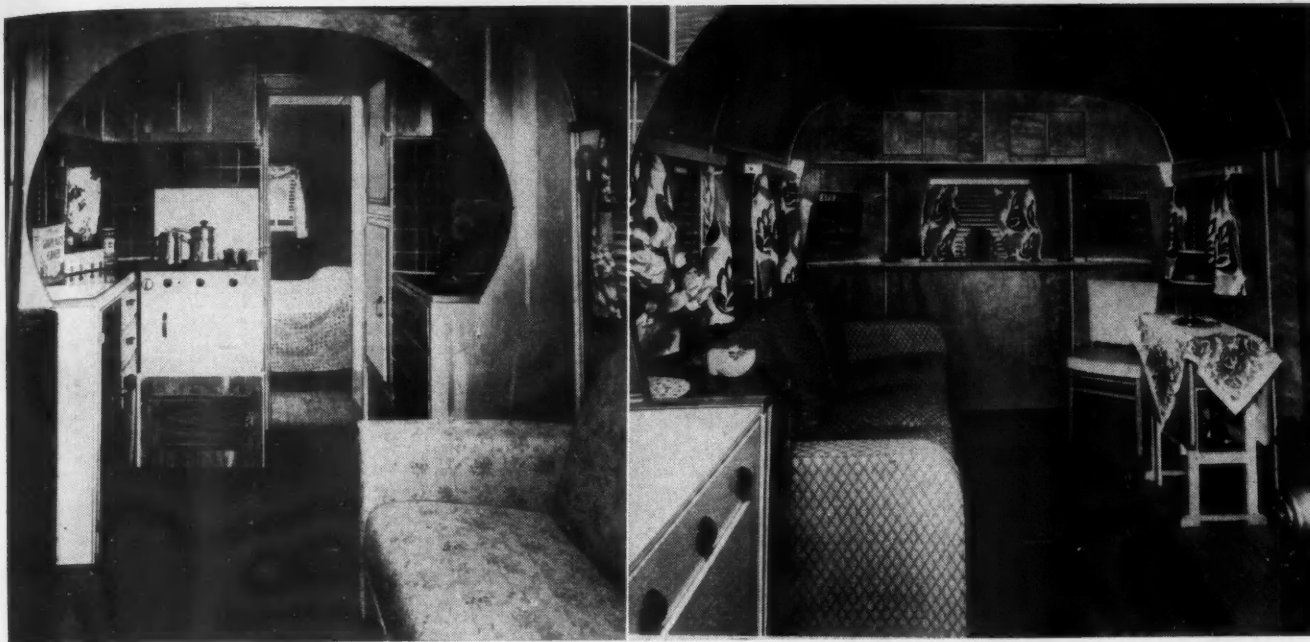
Invade the East



This Indian Super-Chief features four-wheel electric brakes and a one-piece welded frame. It is equipped with an automatic electric hot water heater, six cu-ft Frigidaire, circulating hot air heater, and other conveniences

The Castle Model National has smooth, exterior lines and is equipped with all modern conveniences. Its overall length is 26 ft





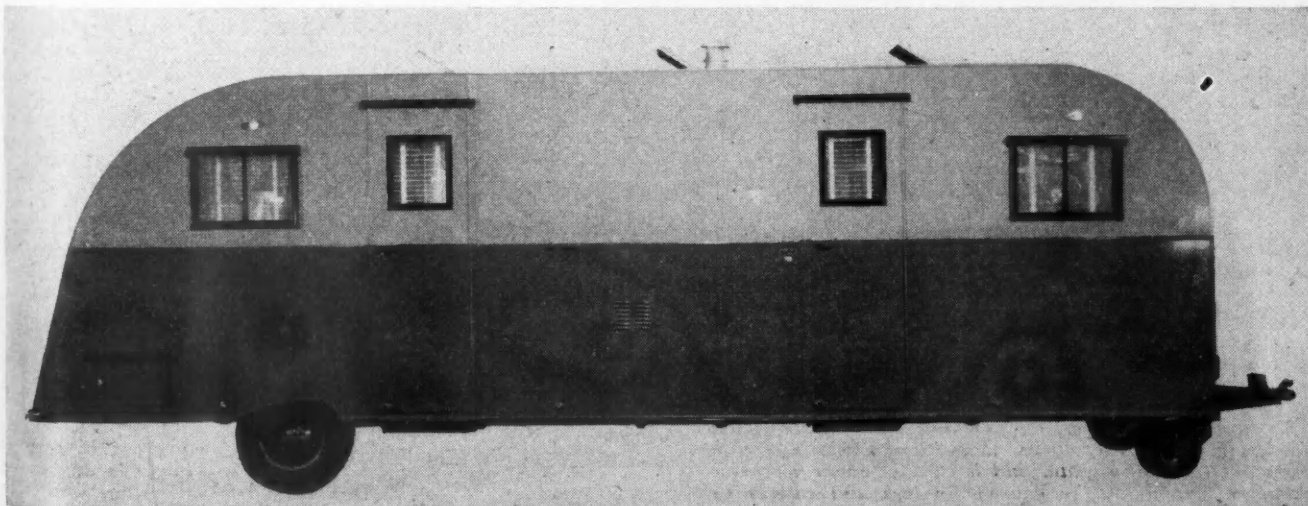
(Above) Typical homelike conveniences are shown in these interior views of Prairie-Schooner trailers

MARKING the first time that a trailer coach show has been held in the East, the 13th annual National Trailer Coach Show, sponsored by the Trailer Coach Manufacturers Association of Chicago, was held Nov. 8-15 in Philadelphia. Over 150 coaches together with the latest in standard equipment furnishings, were displayed by 39 manufacturers. Priced from \$1,295 to \$6,000, these modern trailers featured nurseries, sun porch extensions, living room fireplaces, stall showers, electric refrigerators, gas ranges and other concomitants of modern luxury living, with trailer lengths ranging from 13 ft to 33 ft. The trailer coach industry estimates record sales of \$150 million this year with a jump to \$180 million in 1948. On these two pages are shown several trailer coaches displayed at the Philadelphia show.



The Duo Terra Cruiser "de luxe" is insulated with semi-rigid spun glass and provided with a thermostatically-controlled, air-conditioned heating system

A four-wheel suspension at the front of this Walco 28-ft Tuxedo Model is adjustable to provide the desired trailer weight on the car. This feature also provides hydraulic cushioning for the front suspension

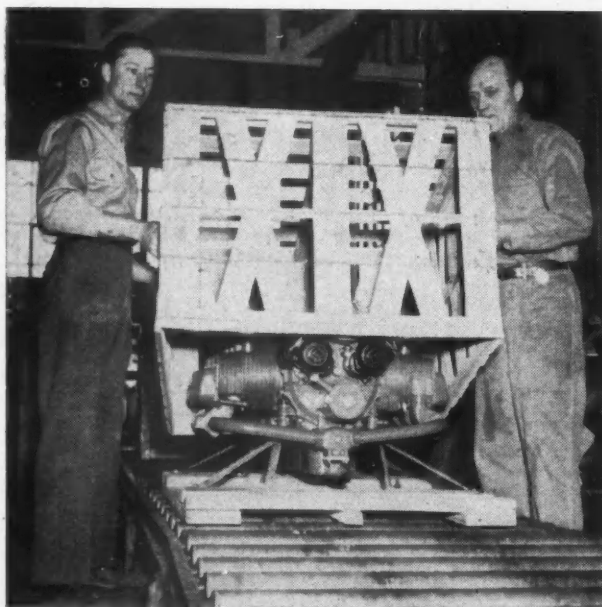


Electronically-Controlled Multiple-Wheel Grinder

A RECENT application in the industry is this Norton multiple-wheel crankshaft grinder, installed at Packard for grinding the main bearing line of its 1948 eight-cylinder engine crankshafts. The machine has two grinding wheels, and has a fully-automatic cycle of operation with electronic control. The wheels are indexed to take two bearing journals at a time and change spacing automatically—by a movement of the wheel heads—to take two journals at a time progressively until the four pairs of journals have been ground. Sizing also is fully automatic.



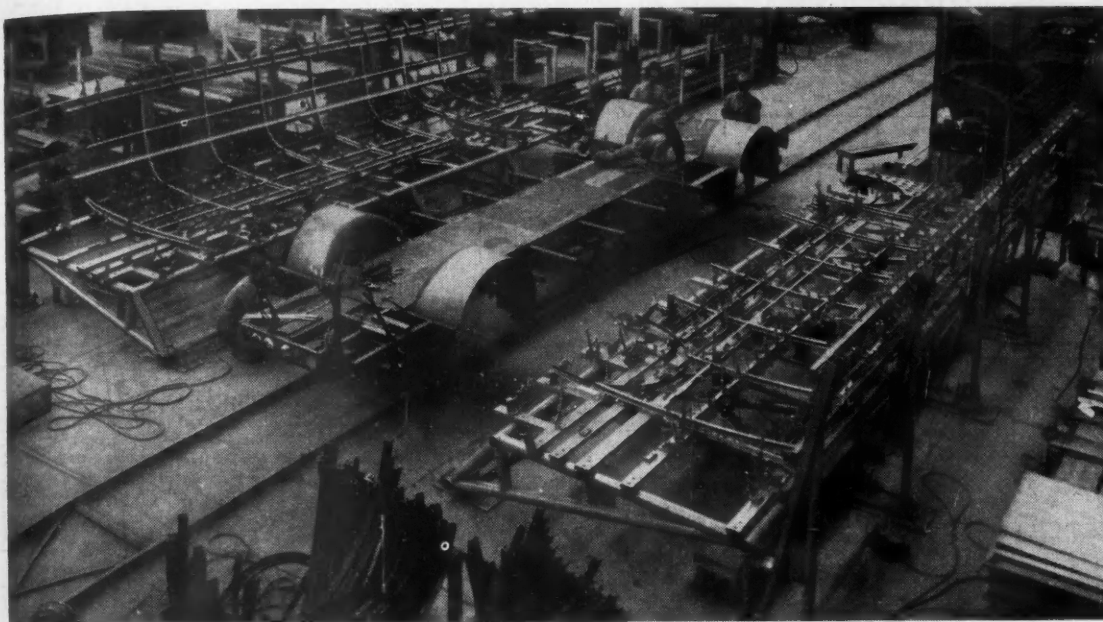
Improved Shipping Containers



Developed for Aircooled Motors to provide an economical and protective means of shipping Franklin aircraft engines is the wirebound container shown in this photo. The entire engine is carried on four steel supports bolted to the base of the crate in such a way that the engine does not touch the crate, and is thus safeguarded from damage that might be caused by jars and shocks in shipping.

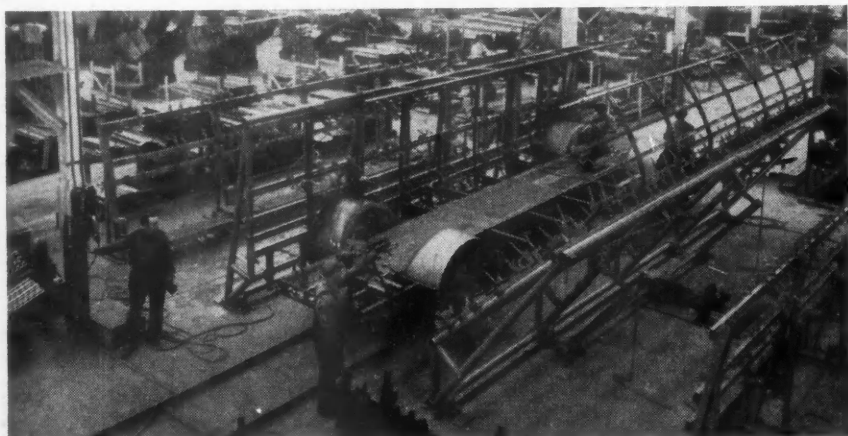


(Left) This pallet-type container was developed by the manufacturing research department of International Harvester Co. as an economical means of shipping parts to depots and warehouses, and as a replacement for the conventional stationary warehouse storage bin. The pallet feature permits it to be handled by mechanical means from four directions, and to be tiered, one on top of the other, as a conservation of floor space. The front of the container consists of a hinged door secured by a wire. By cutting this wire, as indicated in the photo, this hinged door drops down, and the box serves its purpose as a storage and disbursing bin. When empty it can be knocked down for returning to the shipper for re-use.



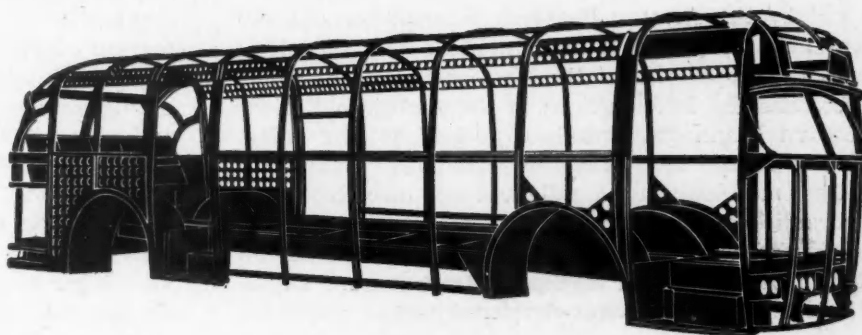
This view shows floor frame in center with a jig on each side, to which side and roof structural parts were clamped into position and then welded together.

Positioning Jigs Aid Bus Frame Construction



(Above) Jigs with side and roof structural sub assemblies being raised into position. Then the center longitudinal roof members are trued and welded together. Side members are welded to floor frame.

DEPARTING from conventional bus construction methods, the Mack Manufacturing Corp. now uses double jigs for building frames for its C-41 buses. As shown by the illustrations, the side and roof steel members are first laid out on the positioning jigs, then clamped into place and welded together. Then both sides of the jig are raised by means of a power lift to meet the floor frame. This method is claimed to permit exact alignment of the parts during welding and to prevent weakening strains during construction.



(Right) Drawing of complete steel frame for C-41 bus.

$$\text{Corrected Torque Capacity, } T_c = \left(\frac{\text{Tested Torque, } T}{\text{Test RPM}} \right)^2 \left(\frac{10}{\text{Test Unit O. D.}} \right)^5$$

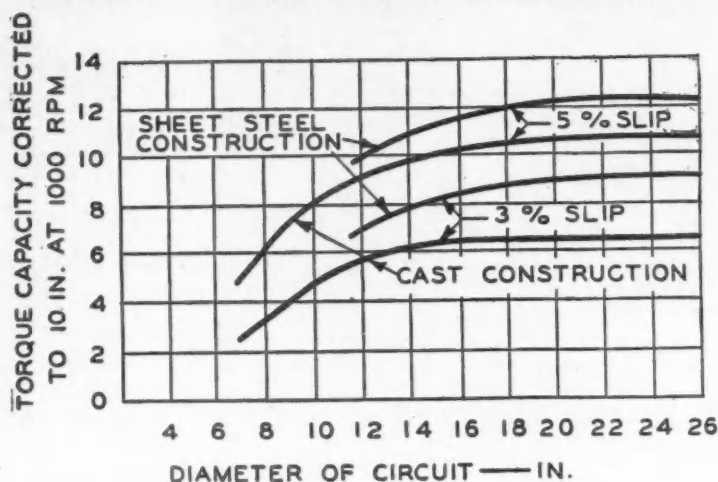


Fig. 1—These curves show corrected torque capacity vs coupling diameter for hydraulic couplings of sheet steel construction and cast construction.

$$\text{Drag Torque Factor} = \frac{\left(\frac{\text{Drag Torque at Normal Stall RPM, } N_s}{\text{Torque Capacity at 3\% Slip at Normal Operating RPM, } N_o} \right) \left(\frac{N_o}{N_s} \right)^2}{\left(\frac{\text{Drag Torque at Normal Stall RPM, } N_s}{\text{Torque Capacity at 3\% Slip at Normal Operating RPM, } N_o} \right) \left(\frac{N_o}{N_s} \right)^2}$$

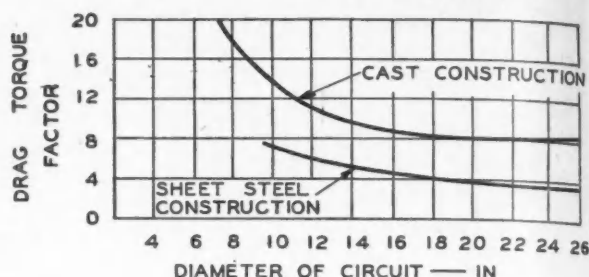


Fig. 2—Comparative performance of sheet steel and cast couplings is shown by these curves of corrected drag torque factor vs coupling diameter.

Torque Converters Evaluated at Hydraulic Conference

Features of Tucker Hydraulic Drive Disclosed, Fluid Drive Proved More Economical Than Mechanical Transmissions, and Torque Transmitting Characteristics of Couplings Discussed

AT THE third annual meeting of the National Conference on Industrial Hydraulics, held in October at Chicago, nearly 300 engineers, scientists, and other hydraulic representatives gathered to hear and discuss 11 technical papers on new developments and applications in hydraulics. The Conference was sponsored by the Armour Research Foundation and the Graduate School of Illinois Institute of Technology with the cooperation of the Western Society of Engineers and the local sections of the American Society of Civil Engineers, American Society of Mechanical Engineers and the Society of Automotive Engineers.

The meeting was highlighted by discussions on hydraulic couplings and torque converters for automotive transmissions, with a brief reference to the design of the Tucker hydraulic transmission and a description of a German-developed torque converter

for passenger cars. Also of interest were the sessions on cavitation, hydraulic controls and industrial applications of hydraulics, which featured reports on hydraulic governor operation, hydraulic circuits of industrial process controls, and theoretical and experimental data on the development of a hydraulic seal. The cavitation session included papers on cavitation in marine propulsion and in centrifugal pumps.

R. H. Hensleigh, consulting engineer and designer of the Tucker hydraulic drive, discussed hydrostatic and hydrokinetic or hydrodynamic types of hydraulic transmissions and the advantages of each in his paper "Some Recent Developments in Hydraulic Transmissions." For reasons involving patent security and present Tucker policy, he was not permitted to describe the Tucker torque-converter drive in detail. However, he did state that this drive was entirely hydraulic,

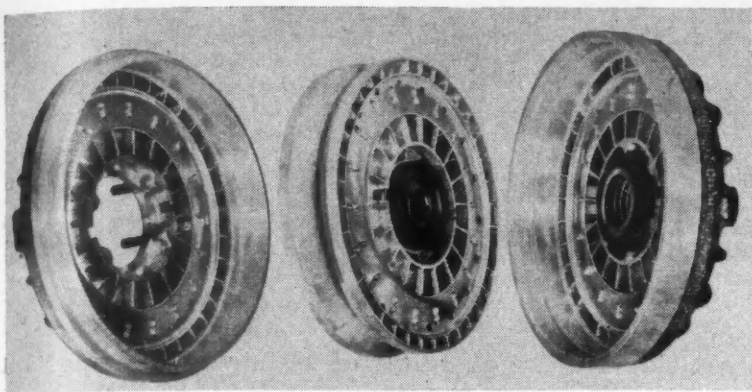


Fig. 4—Parts of small cast aluminum coupling.

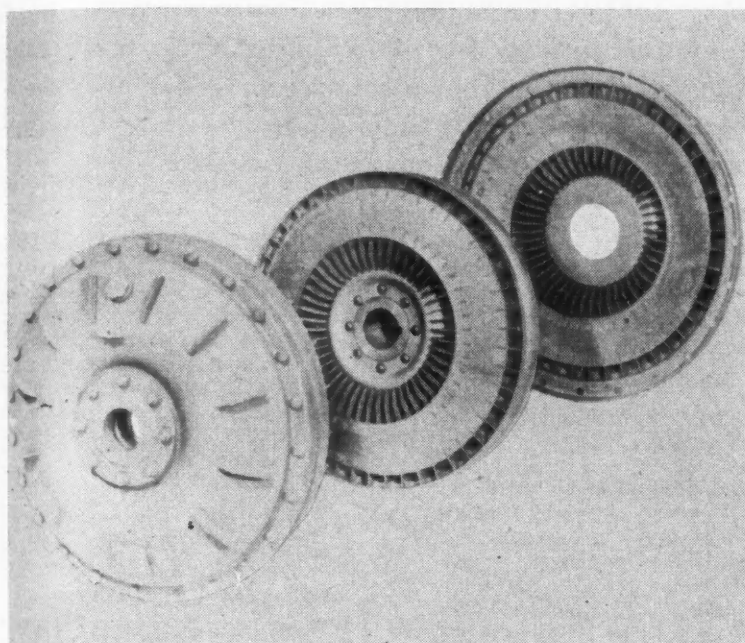


Fig. 5—Parts of sheet steel coupling of spot welded construction.

By Robert C. Mack

and that, because of space limitations resulting from the unusual engine installation, no gears whatsoever were used. He said that engine torque from the transversely-mounted power plant was taken from both ends of the crankshaft and transmitted to the rear wheels by means of two hydrodynamic transmissions, each unit driving a wheel independently of the other. Requirements for the installation he listed as: maximum transmission diameter of 15 in. with input torque of 225 lb-ft at 1000 rpm and torque multiplication factor of 4.7, and a universal joint five in. from the end of the crankcase. The pump of the converter, he disclosed, has constant torque characteristics to hold the engine close to its full-throttle capacity at all speeds, and the turbine and stator sectors were designed to give efficiency over a broad enough range to allow the drive to be through the converter at all times. Mr.

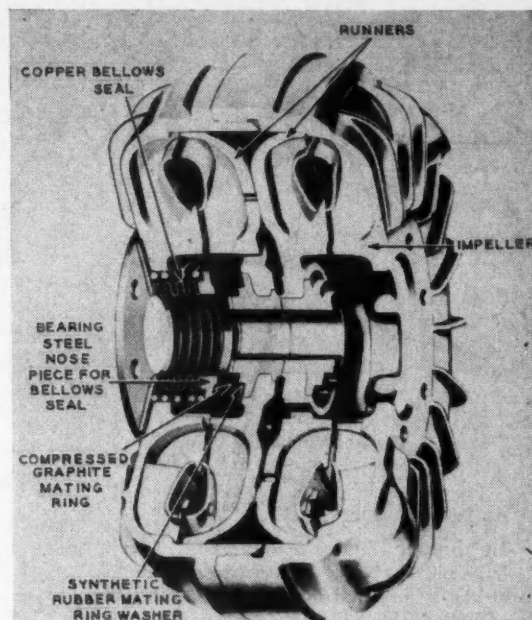


Fig. 3—Cutaway drawing of small cast aluminum coupling.

Hensleigh stated that reverse drive with this installation was obtained by means of sliding splines.

Considerable interest was shown in a surprise talk by Dr. W. Spannhake, former German research scientist who is now connected with the Navy Department's David Taylor Model Basin. Dr. Spannhake discussed German developments in hydraulic transmissions, showed several slides, and described a German-developed torque converter for passenger cars.

Abstracts of the three papers presented at the automotive transmissions session of this conference are presented herewith.

Practical Hydraulic Coupling Design Modifications

By Wilbur F. Shurts,
Twin Disc Clutch Co.

IN THE process of developing a complete line of hydraulic couplings, it is necessary to devise a "yard stick" in order to have a means of judging the quality of performance. In general theoretical design it has been stated and assumed that the torque capacity of any fluid pump varies as the square of the speed and that the horsepower varies as the cube of the speed. A complete test of any unit over a wide range quickly shows that this is only relatively true and that extrapolation based on the square and cube law will lead to errors. It has also been stated that the horsepower capacity of a fluid pump varies as the fifth power of the

(Turn to page 78, please)

Current Developments In Body Engineering

Cab Heating, Cooling and De-Icing

By H. G. Junger
Anemostat Corp. of America

In heater installations for truck cabs, it has been found desirable to provide a method of re-circulating a portion of the air where extreme sub-zero temperatures are encountered. A simple damper is generally included in the system, which when turned to re-circulating shuts off all or a portion of outside air. The heated air leaving the coil is then delivered to a specially designed Anemostat air diffuser. This diffuser is so designed that a quick mixing of hot supply air with the 65 F cab air is accomplished within the device itself. This provides immediate temperature equalization, and has been found so advantageous that it has been used in conjunction with gasoline heaters where a hot blast would be found objectionable. Since it distributes the incoming air evenly over the entire cab, proper distribution is the result.

The final location of the air diffuser is selected to meet the requirements of air distribution and anti-icing. In some cases, it is mounted on the instrument panel for economical reasons. In this manner, heating and anti-icing may be accomplished from the one point, thus simplifying the overall design. In the event this is not possible, de-icing connections are required. For this type of installation, it has been found that an anti-icing nozzle, originally developed for aircraft, was the solution. This outlet provides complete coverage of the windshield providing complete de-icing of it.

In designs where summer comfortization is provided for the driver, the air pattern is changed so that, instead of a flat horizontal pattern blanketing the windshield and side glass surfaces, the air is diffused forward in a turbulent rapid motion. This air motion increases the evaporation of moisture from the skin surface of the occupant and reduces the effective temperature. This is believed to be an important function of any truck cab heater system, since effective temperature is an index of the actual feeling or sensation of hot or cold comfort or discomfort felt by a person. It takes into account the variables of temperature, humidity, air motion and even radiation; thus at a

Presented herein are abstracts of some of the important papers from the technical convention of the American Society of Body Engineers, Inc., held in November at Detroit. Subjects covered include: small car designing; Anemostat air diffuser for recirculating air in truck cabs and buses; a precision reproduction process for body engineering; a new adjustable automobile seat; new developments in Plexiglas; and trends in body design.

given humidity identical sensations of comfort may result by a cool temperature and low air motion, or with higher temperature and more rapid air motion.

Smaller Cars

By W. D. Appel
Chief Engineer, Willys-Overland Motors

The trick of designing the small car is to make it roomy inside yet small outside. It is only by establishing smaller dimensions in length, width and height that the ultimate objective—lighter weight—can be obtained. In the average car of today there is ample opportunity for reducing outside dimensions without impairing inside space. One of these is in the thickness of cushion backs. Every inch removed is as good as an inch of wheelbase which, in turn, is equivalent to about 30 lb in car weight. The same holds true in door thickness. It is surprising how much the overall body width is increased and how much weight is added for this feature. In spite of all this it is essential that the appearance of the car be attractive.

The smaller car should have about the same height, width and length proportions as the larger car. Starting with the front view, if it has a narrow tread the overall width will make the car look tall and gaunt unless the height is suppressed in proportion. The reduction in overall height which gives the front view the proper proportion will also help in the side view. The shorter the wheelbase, the less the ground clearance need be to avoid scraping the crown of the road in negotiating hummocks and pot holes. This allows the floor to be placed in a lower position. Seat height above the floor is usually the same as is the practice on large cars, although on some sport cars this is reduced for appearance sake.

Seating comfort must not be impaired. The height, width and leg room for each passenger must be equal to that allotted in the big car. Steering wheel diameter, therefore, cannot be reduced much and pedals must be of the same size. In addition, there must be adequate room between pedals to place the feet in comfort without interfering with anything.

Use of Precision Reproduction to Facilitate Body Engineering Programs

By Cecil G. Shuert
Engineering Reproduction, Inc.

A metal-drawing reproduction process, in order to qualify as a useful and satisfactory tool in the automotive and other industries, should meet the following requirements:

First, it should have the ability to furnish accurately gridded original layout panels, such accuracy of 10 inch lines to be greater than that obtained by any highly skilled draftsman.

Second, it should embody precision by accurate reproduction of the original drawing with good line definition and clean background. By accuracy in metal drawing reproduction, the reproduced grid pattern on an original layout panel should maintain a tolerance of 0.003 in. in 14 lineal ft. Precision reproduction of drawn lines should maintain the same tolerance of 0.003 in. or less without regard for the panel size.

Third, it must not have size limitations—it must be able to reproduce the present large layout panels now being used in one piece.

Fourth, it must have a reproduced surface that is emulsion-free, identical to original drawing panels, for changes or additional drafting.

Fifth, it must not require changed or special drafting techniques.

Sixth, it should be flexible in its types of reproductions, producing with ease drawing replicas, conventional template prints, tracing cloths, vellums and various colored images.

Seventh, it should permit removal or shifting of views and the production of expanded replicas.

Eighth, it should save engineering time and be low in cost.

For the past two years at least one of these reproduction processes has met all eight of these requirements, with the exception of expanded reproductions required for shrink use. Under this system, precision reproductions are now being produced as accurate grid layout panel forms which check 0.003 in. in 14 lineal ft. The surface is good quality paint, with no emulsion residue to interfere with drafting. The reproductions are automatically dimensional replicas of the original, and can be made in one piece over 30 ft long. Actually there is no apparent size limitation, although practically, six ft by 20 feet seems large enough. Also, with no emulsion residue on the surface, the surface can be identical to the original layout, lines will not rub or abrade off and additional drafting is facilitated. The process utilizes existing drafting techniques without change—just good clear lines are all that is required, and permits reproduction in reference type replicas, in template form with the lines slightly etched into the metal which are similar in appearance to those laid out by hand, and on tracing cloth or vellum. Also, the process permits any selected color of lines.

With views and images accurately repositioned, the process is useful for a variety of purposes. Blocking out of areas is simply accomplished; and the process results in a substantial saving in time and cost to its users.

Recent Developments in Seat Construction

By Charles E. McCormick, President
McCormick Products Co.

A vehicle seat is subject to constant vibration while moving at various speeds, and the supported body is acted upon by forces of varying intensity and in many directions. This results in practically continual relative movement of spring elements, padding, cloth and other working parts. Thus it can be seen that an automobile seat is a working mechanical unit which absorbs exterior forces which would otherwise be injurious and uncomfortable to the supported body.

The covered surface of the seat should be as freely resilient locally as possible. To accomplish this result, the individual spring coils should be freely compressible without undue restriction by adjacent coils or by rigid rims and braces. In addition, the padding should not have layers of excessive coarseness or stiffness. In this way a seat surface

may be developed with proper unit pressures which depend principally on the gage of wire and other characteristics of the spring coils, rather than being affected principally by the character and tightness of the cloth cover.

The length of the individual spring coils greatly affects the efficiency of the ride, and incidentally the cost. Shorter coils, where possible, allow lighter gage wire which in turn gives softer more comfortable support, and lower cost.

The use of different coil lengths in the various areas of the seat has led to the development of a seat pan contour which approximately parallels the body. This has resulted in more comfortable pressure characteristics of the supporting surface, and has reduced the pounds of spring wire used.

It has been found that the shape of the seat pan is more important than the free surface contour of the seat and that actual headroom is not accurately determined by measurements taken to the outer surface of the seat. The outer surface contour is only important in its position in relation to the seat pan contour since that determines the length of the spring coils. Also, the outer contour should be of pleasing appearance and sufficiently convex to maintain the cloth cover as free from wrinkles as possible. There should be no sudden change in curvature of the cloth, particularly along the outer edge portions of the seat, in order that a minimum tension in the cloth will maintain the cover reasonably free from wrinkles. Sudden changes in direction of pull on the cloth cause wear and wrinkling of the cloth as well as contributing to a poor ride. To obtain the best conditions for the cloth, the rims of the spring assembly should be light, flexible, and be padded to avoid stretching the cloth over a relatively sharp stiff edge.

It is believed that an automobile seat should be reduced to a simple clean structure free from foot rest, side panels and the usual boxlike base which is a dirt catcher and obstructs uniform ventilation and heating of the car's interior. This simplicity of design leads to saving in both weight and cost. Such a seat must be spaced a proper height from the floor, and arranged to be adjusted in relation to steering wheel and driving controls. Since it is believed that a great many seat slide troubles are due to their location midway between seat and floor, which causes lateral weaving, and also due to the desire to attain a clean simple effect under the seat, this design provides seat slides solidly mounted in shallow recesses in the floor pan and substantially covered by the floor carpet. The slides operate in a horizontal plane only, and no counterbalancing is necessary. The right and left slides are interchangeable, and can be locked and unlocked simultaneously by simple electrical solenoids actuated by button control located on the steering wheel or instrument panel. There is no shaft or

other mechanical connection directly between the two slides. The operation is very smooth, the construction is rugged and will withstand a lot of abuse.

The Application of Acrylic Plastics in Automotive Body Design

By Willard F. Bartoe, Chief Physicist
Rohm and Haas Co.

A technical problem, and one of profound interest, concerned with large area glazing is that of the proper choice of light transmission characteristics. The problem presented by the harmful and discomforting effects of sunlight is obviously very important in considering the enlargement of transparent areas in motor vehicles.

The radiant energy of sunlight at sea level is spread throughout the range of approximately 290 to 3000 millimicrons wavelength with its peak occurring at approximately 550 millimicrons in the yellow portion of the visible spectrum. Regular Plexiglas transmits relatively freely all of this radiation. This being true, objects not otherwise shielded from sunlight will be subject to sunburn, color fading and radiant heating.

U.V.A. Plexiglas has been developed to eliminate entirely the very objectionable erythema or "surburn" wavelengths without changing the visible appearance of the base material, that is, without introducing any color. This material also absorbs some of the highly actinic wavelengths between the sunburn and visible bands. Further absorption of these wavelengths can only be accomplished by some color change as must obviously be the case with the wavelengths in the 400 to 700 millimicron visible band. However, special Plexiglas colors have been developed which absorb selectively in the visible and infrared bands in such a manner as to reduce significantly the amount of radiant power that they transmit without significantly affecting the acuity of vision through them since their visible band transmission is peaked at about the same wavelength as the peak of the normal visibility curve. For example, one of these colors reduces the total solar radiant power transmission by slightly more than 50 per cent while providing approximately 80 per cent transmission at the maximum visibility wavelengths.

More recently Plexiglas colors have been developed which absorb uniformly throughout the entire solar radiation wavelengths. These colors are extremely interesting in that they are practically neutral in shade and, therefore, produce no change in color appearance of objects viewed through them. Although these colors are so new that only limited service exposure tests are available on them, they are expected to be very light-stable.

(Turn to page 76, please)

The Aircraft Industry S

THE critical need for a sharp re-defining of U. S. Air Policy will be met shortly by a series of studies now in progress. The necessity for a new policy is evident: (1) the preparedness of the Air Force is inadequate in the face of an expanding U. S. foreign policy; (2) the aircraft manufacturing industry is in severe financial straits; (3) the air transport industry is dislocated and in marginal operation; and (4) private flying is stymied.

These facts, in addition to numerous others, have demanded a thorough investigation of the national need to permit formulation of a more definite and progressive national air policy. Recognition of the crisis in U. S. aviation came belatedly but simultaneously in both the executive and legislative branches of the Government. On July 17, 1947, President Truman appointed a temporary Air Policy Commission and the Congress coincidentally established an Aviation Policy Board.

The purpose of these two groups is identical; their reports are due Jan. 1 and March 1, 1948, respectively. The difference between the two groups centers in two important facts: (1) the President's group is composed entirely of private citizens; the Congressional group of members of Congress; and (2) the President's group will prepare a report for the guidance of the President in requesting and approving legislation; the Congressional group will propose legislation and cooperate in urging its passage into law. Simply, the President's group can only advise; the Congressional group can execute a program through appropriations.

Clear-Cut Pattern

The testimony presented before the groups is the same and there has been a free interchange of testimony between the two groups. The President's group has heard the studied opinion of every segment of the aircraft industry and has left no stone unturned in its search for the facts of the case. And yet the task has not been difficult for throughout the presentation a continuous thread extends through the maze of a technical and often unique human endeavor.

Because of this clear-cut pattern of evidence it is possible to sum up with brevity the case for the aircraft industry and to categorize all of the millions of words of testimony, the hours of oral presentation and the vast amount of data presented to the investi-

By Robert McLarren

gators into a series of recommendations. According to the industry itself, including all of its many segments, here are the basic requirements for a new

U. S. Air Policy:

(1) Continuity of procurement over a continuing period of five years. The services are geared inextricably to an annual budget approved by the Congress. Appropriated funds must be spent within the fiscal year or obligated for a period not to exceed two fiscal years. The complexity of Government financial procedure requires the preparation of requests many, many months in advance with all its accompanying lack of realistic and timely appraisal of international and national situations. So far in advance must budget requests be made that permanent budgetary offices are maintained by Government agencies to enable the commencement of 1949 budget estimates, for example, immediately upon enactment of 1948 budgets. More serious, however, is the fact that many projects cannot be completed in a one or two-year period. The design, test, development and production of a heavy bomber, for example, is a six-to-seven year project. This means that an economy minded Congress can fail to provide for the continuance of such a long-term project during any one of the six or seven years, forcing its discontinuance mid-way through the job.

Dependent on Military

The industry, which must rely for 60 to 75 per cent of its business on military procurement, cannot intelligently plan its plant operation on such a year-to-year basis, for a lean year can seriously disrupt its operations for a following period of two or three years. What the industry seeks is Congressional authority for a five-year program of Air Force and Bureau of Aeronautics procurement with annual appropriations supporting this authority. By granting this authority while appropriating only on an annual basis the terms of the Constitution will be complied with and both the industry and the services can plan intelligently.

(2) A level of procurement adequate for the support of an industrial nucleus capable of rapid expansion in emergency. The Air Coordinating Committee, composed of Army, Navy and civilian government agency members, made a thorough study of the minimum level of annual procurement which would sustain an aircraft industry capable of expansion in the event of a national emergency to provide the re-

States Its Case

quired production to meet sustained warfare. On the basis of these thorough-going studies, the ACC believes that at least 3000 military airplanes weighing 30,700,000 lb must be procured annually to sustain an industry capable of the rapid expansion required for the national defense. In addition, at least 325 transport planes, a vital supporting force for combat operations, must be procured. The aircraft industry supports these figures as realistic although warning that they are the absolute minimum.

(3) An expanded research and development program adequate for the maintenance of U. S. technical leadership in aeronautics. The rapid progress of aircraft in speed, altitude and range has placed a heavy burden on the research facilities of the nation. In addition, as aircraft speeds approach the sonic range, the scientific problems grow progressively more acute requiring complex and extremely costly research facilities for their study. The growing promise of pilotless aircraft and guided missiles demands an immeasurable quantity of research if this nation is to remain ahead. Nor is research alone enough. Prototypes must be built and wind tunnel theories proved by actual flight tests. Limited production quantities of new aircraft and missiles are required to establish and prove production tooling and manufacturing techniques required for their mass production. These efforts will require greatly increased funds for research and development.

(4) Creation and support of industrial mobilization planning as an integral part of production procurement. The acknowledged lack of time in any future national emergency for the painfully slow expansion of production facilities and the re-alignment of industry on a wartime footing demands peacetime planning

**Table I—Aircraft Companies' Operating Results
1945-46 and First Six Months 1947**

(000 omitted)

Company	1945 Income		1946 Income		First Six Months—1947		
	Before Taxes	After Taxes	Before Taxes	After Taxes	Sales	Income Before Taxes	Income After Taxes
Beech Aircraft Corp. (1)	\$ 13,706	\$ 3,722	\$ 853 def	\$ 229 def	\$ 22,386†	\$ 4,366 def	\$1,562 def
Bell Aircraft Corp.	18,965	5,065	2,308 def	658 def	8,882	736 def	211 def
Boeing Airplane Co.	23,071	6,489	4,913 def	1,577 def	10,537	6 def	64
Consol. Vultee Aircraft Corp. (2)	24,637	6,749	9,116 def	2,776 def	14,091	2,478 def	770 def
Curtiss-Wright Corp.	89,600	24,430	33,716 def	8,716 def	38,687	5,908 def	906 def
Douglas Aircraft Co. (2)	24,396	8,956	2,019 def	2,181	54,534	6,712 def	752 def
Fairchild Engine & Airpl. Corp.	1,354	716	(5)	(5)	NA	NA	NA
Grumman Aircraft Engr. Corp.	20,814	5,714	1,499	388	NA	2,121	1,311
Lockheed Aircraft Corp.	6,282	3,490	21,860 def	10,740 def	NA	NA	NA
Glenn L. Martin Co.	38,952	8,379	5,194	3,363	NA	NA	NA
North American Aviation (1)	28,020	7,820	6,501*	4,001	11,849†	3,957	304
Northrop Aircraft (3)	2,363	748	439 def	25 def	NA	NA	NA
Republic Aviation Corp.	5,890	2,254	11,006 def	4,406 def	12,230	2,946 def	476 def
Ryan Aeronautical Co. (4)	1,070	350	500	300	NA	NA	NA
United Aircraft Corp.	26,074	12,855	4,563 def	6,061	97,330	5,492	3,417
Total	\$325,194	\$97,737	\$81,591 def	\$11,684 def	\$270,526	\$19,496 def	\$ 417

(1) Years ended Sept 30. (2) Years ended Nov 30. (3) Years ended July 31. (4) Years ended Oct 31. (5) The 1946 annual report has not yet been released, but AIA estimates have been included in the totals. * North American personal plane, the Navion, discontinued in 1947 at reported loss of \$8 million. def—deficit. NA—not available. † For nine months ended June.

for wartime production. Nor can a mobilization plan be prepared and then placed in storage against some future M-Day. The job must be continuing and constantly integrated with both production and even experimental aircraft procurement. An additional sum must be added to all procurement contracts for the special purpose of preparing plans for the production of the item on a vastly increased scale. For example, a contract for 50 airplanes must include the planning for production of 100, 500, 1000, etc., similar planes to permit a smooth and rapid expansion of the 50-unit production into 1000-unit production should a sudden international situation arise.

(5) Competition must be encouraged and proprietary rights protected. Competition alone assures the maximum technological progress. By bidding against competitors for military procurement each entrant in a design competition is forced to propose a new design the best of which he is capable. Competition insures the government maximum economy by providing it the very best for its money; it insures the nation the most advanced type of aircraft, and it strengthens the industry through economic elimination of the unfit. By thoroughly protecting the in-

ventor in the fruits of his labor, he is encouraged to create and to progress. The creator of a superior combat airplane is entitled to the production of that airplane in quantity and to the benefits of such original ideas as it may contain.

(6) The contractee is entitled to a fair and just profit on his operations. The steadily declining profit rate of aircraft manufacture is destroying the incentive of the industry to pioneer new designs and products. The increasing cost of labor and materials and the complexity and unpredictable problems in new designs virtually prohibits any profit-taking on experimental projects under fixed fee contracts that do not contain the necessary flexibility to accommodate intangibles. Only the clear recognition of a reasonable profit as the major incentive for industry progress can assure that progress.

(7) The Government must underwrite a major portion of the development costs of new transport aircraft. Two factors make this necessary: (1) the acknowledged importance of civil transport types in military operations, and (2) the increasingly great cost of development of heavy, multi-engine types. During World War II the supply of our fighting forces by air was a major factor in our victory. Not only were aircraft mobilized directly from the airlines but tens of thousands of identical types were procured by the military. In any future war, the heavy-duty transport airplane will play an even more substantial role than in the last war. The size and complexity of the modern airliner virtually prohibits its development at airline or industry expense. Since it is essential to the military and since neither the airlines nor the industry can afford its development, the cost burden must logically fall to the military of new transport aircraft.

(8) Procurement procedures must be simplified. The growing complexity of Government procurement procedures are rendering it increasingly difficult to handle Government business. Contracts must be simply written and their provisions carry a greater degree of freedom for the contractee to permit his processing of

the work more quickly, more easily and more efficiently. Standardization must be simplified and greater industry competence recognized. Contracts should specify only that the product meet certain performance guarantees with materials and processes left to individual company know-how with a reasonable regard for the interchangeability requirements of the service. Research and development contracts should specify only the results desired with methods, techniques and due dates determined largely by the contractee.

(9) The Civil Aeronautics Act should be supported substantially as it is written. No consolidation of various Government civil aviation functions should be attempted nor should their present nature be changed. The Civil Aeronautics Board should be moderately decentralized to relieve board members of their excessive work load by detailing much of it to subordinates. This would permit more rapid disposition of cases and permit board members greater concentration on decisions. Air safety should be removed from the jurisdiction of the Board and placed either in an independent agency or within the Civil Aeronautics Administration. The CAB should confine itself more with the sound economic expansion of the nation's air routes and less with minor financial matters of individuals in the industry. It should give greater encouragement to uncertificated air freight carriers.

(10) Aeronautical education should be greatly expanded and encouraged. The present shortage of skilled scientific personnel is due to continue at least through 1951 and engineering and technical studies should be expanded. The teaching of aviation in the primary and secondary schools should be enlarged and flight training should be made available to all those who desire it. Only on a sound foundation of youth air education can this nation mold that future Air Power on which its integrity so greatly depends.

Abstracts of some of the important reports recently submitted by aircraft company executives before the President's Air Policy Commission are presented herewith:

Aircraft Industry Finances

By Ralph V. Hunt,
Vice President-Comptroller
Douglas Aircraft Company, Inc.

THE aircraft industry is struggling through its second post-war year of great deficits. As shown in Table I, (see page 41), the 15 major companies incurred an aggregate loss of nearly \$82 million before tax carryback credits, and after \$70 million of such credits the net loss still amounted to almost \$12 million. The marked contrast between the 1946 losses and the 1945 profits is also shown in Table I. The same companies in 1945, despite the sharp drop in volume during the latter half of the year following war termination, reported aggregate income of \$325 million before taxes and nearly \$100 million after taxes.

The primary cause of this dismal earnings record in 1946 was the destruction of the market for aircraft. The 15 aircraft companies had sales in 1945, not the peak year of the war demand, totalling \$5.7 billion; in 1946 the sales of these companies amounted to less than $\frac{1}{4}$ of \$1 billion, a shrinkage of more than 87 percent. Douglas' sales alone in 1945 were larger than the industry total in 1946.

Unsatisfactory as the 1946 earnings were, the industry nevertheless had the benefit of two factors which have lessened or are altogether inoperative during the present year. The financial reports for 1946 covered fiscal years beginning as early in some cases as August 1, 1945; in these and other instances the carry-overs of war-time revenues and termination activities were of considerable importance in sustaining income during 1946 fiscal

year. Most important, the companies had the benefit of tax carryback credits to an extent that is not present during 1947, and that will be virtually non-existent by the end of this year.

As shown by Table I, the ten companies for which interim 1947 reports are available have thus far reflected a composite operating loss of \$19.5 million. Only two of the ten companies were able to show operating earnings. Excluding those two companies, the losses for the other companies before the tax credits totalled more than \$27 million, or at an annual rate of deficit in excess of \$54 million. These same eight companies during 1946 had a total operating loss of slightly over \$63 million; thus, the rate of loss has not lessened importantly during 1947, despite the retrenchments and economies that have been effected and working capital continues to be depleted rapidly.

Costs Involved and Organization Required to Operate a Heavy-Bomber Plant

By William M. Allen
President of Boeing Airplane Co.

As the science advances and the airplane becomes larger and more complex, costs and the required research and development increase out of all proportion to the increase in size. This is well illustrated by a comparison of costs between the first B-17 and the first B-29. The first model 299 (prototype of the B-17 Fortress) required 150,000 engineering man hours and was constructed at a total cost of \$660,000. The first three XZ-29 airplanes required 1,433,000 engineering man hours and were constructed at a total cost of \$8,850,000. (One XB-29 would have cost approximately one-half this amount.)

The operation of a heavy bomber plant cannot be carried on successfully below a certain minimum level if it is expected to meet the following objectives: develop the world's best heavy bombers; produce such heavy bombers in production quantities at a reasonable cost; and maintain a plant containing the necessary facilities and an organization consisting of all the necessary skills capable of reasonable expansion in time of emergency. These objectives cannot be obtained with respect to a heavy bomber plant unless it can maintain a minimum employment of approximately 13,000 employees, which means an annual dollar volume (based on current labor and material costs) of approximately \$80,000,000 in order to carry on with necessary experimental models, produce small quantities of service test airplanes and maintain a delivery schedule on production models of five per months. This is the minimum volume

which will permit construction at reasonable costs and provide enough projects in various stages of development and production to sustain a well balanced organizational nucleus capable of reasonable expansion in an emergency. This level of production is based on the size and complexity of bombers such as the B-50 currently in production. As larger bombers now in development stages go into production these figures will be subject to upward revision. Minimum number of employees and minimum number of aircraft required for the successful operation of a heavy bomber plant are illustrated in the graphs of Figs. 1 and 2.

Effect on Requirements for Developing and Manufacturing Facilities of Eventual Transition from Aircraft to Push-Button Weapons

By Harry Woodhead, President
Consolidated Vultee Aircraft Corp.

THE most outstanding developments in the field of push-button warfare were the German V-1 Buzz Bomb and V-2 rockets which appeared in World War II. The future evolution of guided missiles in this country will result first in the development of target-seeking anti-aircraft missiles, either rocket or ram-jet propelled, which should be in practical operation for military combat use within a relatively few years, possibly five at the most.

The next stage will undoubtedly be the development of self-propelled, controlled missiles for use with ground troops or surface vessels against tactical targets at ranges from 25 miles up to several hundred miles. These missiles, it is believed, can be made available in five to eight years.

Ultimately, the self-propelled controlled missile for long-range operations for the destruction of strategically important targets will be developed. Such missiles will be used to replace or supplement strategic bombers, and will permit "push-button warfare" in its most literal sense. They will be many times larger than the V-2 (which had a gross weight of 28,600 lb and a weight empty, less

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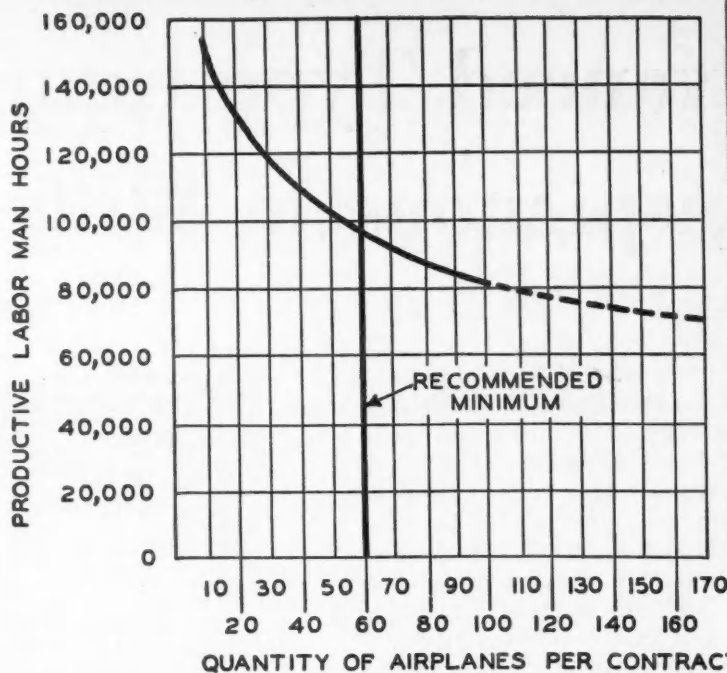


Fig. 2—Minimum number of airplanes per contract required to operate a heavy bomber plant.

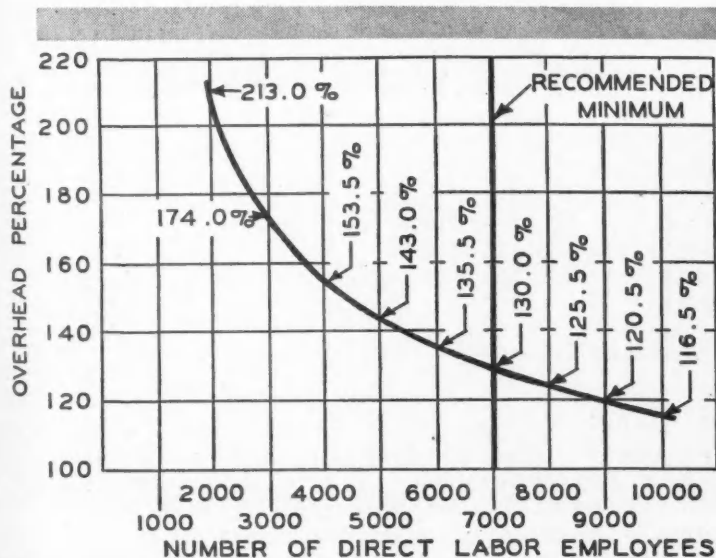


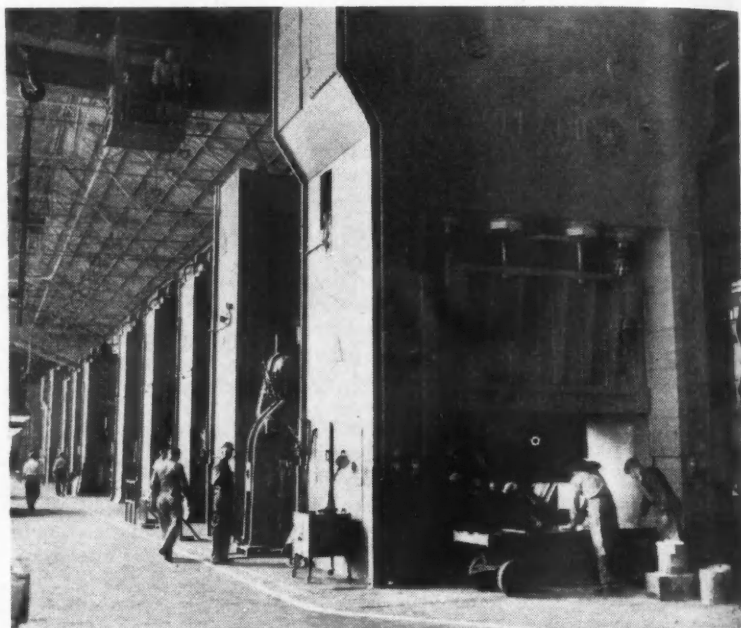
Fig. 1—Minimum number of employees required for operation of heavy bomber plant.

Advanced Type Equipment Conspicuous in Willys Press Shop

A NEW press shop of unusual interest from the standpoint of simple logical arrangement of machinery and operations and featuring presses of advanced type was recently placed in operation by Willys-Overland, Inc., in Toledo. The building for this operation is well suited to the needs of a modern press shop, accenting efficient material and scrap handling, and good seeing conditions. It is attractively painted in an overall treatment of tints of an "apple" green, outlining the ceiling and walls in the lighter tint, darker for the machinery, and still deeper for dados.

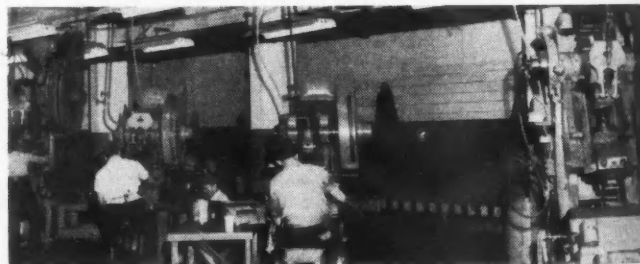
Outstanding is the long line of latest type Clearing crankless presses, one of these being double-acting, another triple-action. In all they have 23 of the Clearing presses in this plant. In addition, there is a line of the small inclinable Bliss presses with air cushions, arranged at the side for handling the gamut of small stampings and heavy

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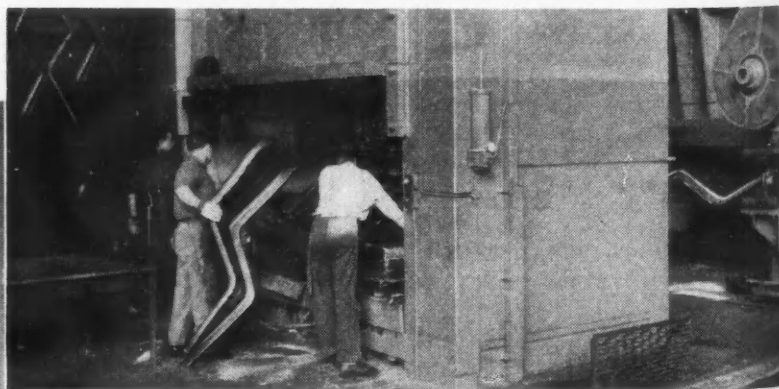
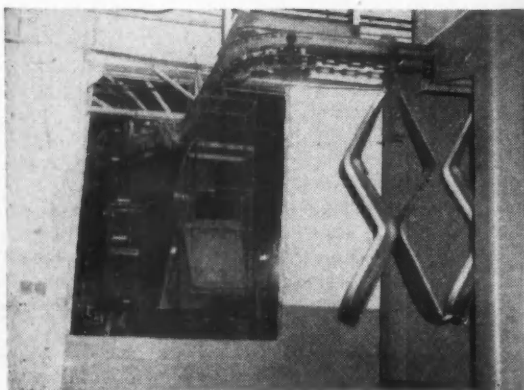


Looking down the long row of big Clearing crankless presses in the new Willys \$5-million press shop.

A glimpse of the row of Bliss inclinable presses for small stamping work at Willys.



The monorail that picks up stampings along the Clearing line comes through an opening in the wall, as shown, turns sharply to enter the R. C. Mahon washing and rust-proofing machine. After passing through the washer, the conveyor continues to the metal finishing room.



Close-up of one of the Clearing presses with operators removing a finish-formed fender. At the right of the press is one of the chute openings through which the trim and scrap is dropped onto the scrap conveyor below floor level.

Important Tariff Concessions in Geneva Trade Agreement

Import Rates on Passenger Cars, Trucks, Tractors, Aircraft and Their Parts Will Be Reduced by Large Number of Countries, Including Australia, Czechoslovakia, Norway, France and Chile. This Article Presents Summary by Country of Tariff Changes Affecting Major Automotive Items.

THE American automotive industry should derive considerable benefit from tariff concessions made by countries participating on the General Agreement on Tariffs and Trade, according to a detailed summary released by the State Department. While exchange shortages and import controls will delay the full effect of the 23-nation agreement concluded at Geneva on Oct. 30, the State Department believes that the rules of international trade conduct and reduction of tariffs agreed to by the participating countries eventually will assure freer movement of automotive products in world trade channels.

Specifically, American negotiators regard with pride concessions obtained from participating nations on automotive vehicles and parts, mentioning these products as having considerable significance in regard to concessions granted by 14 of the participating nations. Important concessions were obtained from 12 nations on aircraft and parts. Tractors, machinery, and machine tools were also high on this list.

The only concessions made by the United States in the vehicle classification were on trucks and parts, buses and parts, and bicycles. A summary of the important concessions on automotive products granted by the participating nations follows:

Australia Grants 20 Concessions

AUSTRALIA—Concessions were made on 20 tariff classifications covering automobiles. The majority of these concessions were reductions in duty ranging from 25 per cent to 60 per cent with corresponding reductions in the margin of preference. The reduction in the rate on chassis was not bound, but the reduction in the margin of preference was bound. The duty and preference on motorcycles were eliminated and this item placed on the free list. The duty and margin of preference on airplanes were reduced from 20 per cent to 10 per cent. Duty and preference were bound on certain tractors at 10 per cent and on others at 12½ per cent.

By Eugene Hardy

Washington Bureau, AUTOMOTIVE INDUSTRIES

BELGIUM-LUXEMBURG-NETHERLANDS—The classifications established for automobiles and parts in the Customs Union tariff represent a marked improvement over the former tariff classifications, particularly over the old Belgian tariff. Ad valorem duties replace the former high Belgian specific rates based on weight, which favored European cars, chassis and parts. On airplanes and parts free entry was assured for those to be used in international traffic and duties of 10 per cent and six per cent for other planes and parts were bound against increase.

Brazil Adjusts Tariff Rates

BRAZIL—The Brazilian tariff is specific and the rates in general have been low. As a result of depreciation of the Brazilian currency, these rates have lost over 40 per cent of their incidence. To take account of this depreciation, Brazil is in process of making a general upward readjustment of its tariff to the extent of 40 per cent. The reasons requiring this readjustment were presented to and accepted by all the countries represented at Geneva. It was recognized that devaluation of currency required readjustment of specific tariff rates if their original revenue and protective incidence was to be maintained, and the readjustment was part of the basis of negotiations by all countries with Brazil.

Duties were reduced on certain automobile instruments and rates bound involving some increase in specific duties, but resulting in ad valorem equivalent of about 10 per cent or less on most trucks from 10 per cent to 20 per cent on light passenger cars, heavy trucks and motorcycles and from 20 per cent to about 30 per cent on heavier passenger cars. The duty on

parts and attachments for earth-moving equipment has been cut by 60 per cent. Thirty per cent reductions were obtained on automobile chassis parts. Agricultural machinery was bound on the free list.

On airplanes and their parts and accessories, most trucks, power cranes and hoists, internal combustion engines, and road building machinery net specific duty increases were accepted but even including these increases the ad valorem equivalents of the rates were held below 10 per cent.

Due to its troubled monetary situation, Brazil was allowed to raise certain duties. Increases in duty have been permitted on passenger automobiles weighing up to 1400 kilograms, trucks weighing over 4000 kilograms, and motorcycles, but on all these items the increased specific rates have been kept at less than 20 per cent ranging down to 10 per cent ad valorem. On passenger automobiles weighing from 1400 to 1900 kilograms, increased specific rates, ranging in ad valorem equivalents between 20 per cent and 30 per cent, were made part of the scheduled concessions.

CANADA—The important automobile schedule was unchanged, but the duties on aircraft and aircraft engines were reduced from 20 and 17½ per cent, respectively, to 15 per cent.

Chilean Duties Lowered

CHILE—Reductions of over 90 per cent of the duty were obtained on trucks, buses and jeeps; over 80 per cent on automobile horns and lamps; 75 per cent on motorized trucks (warehouse type), trailers and third axles and other attachments for increasing the load capacity of trucks; automobile chassis; and axles; on tractors and on spare parts for vehicles the duty was reduced by about two-thirds; reductions of approximately 30 per cent were obtained on storage batteries weighing over 100 net kilograms, and on most passenger cars. In addition, the agreement provides that the Chilean luxury tax on passenger cars, of 15 per cent of the duty-paid value and now applying to all passenger cars with a C.I.F. value of over \$1,200, will apply only to passenger cars with a C.I.F. value of over \$1,500.

Bindings of the present moderate or low duty rates have been obtained on agricultural machinery and parts; pumps; industrial machinery and apparatus, and spare parts for road machinery; internal combustion motors including automobile motors, and electric motors of more than 5 hp; motors and turbines; and airplanes and their parts.

China Reduces Tariffs

CHINA—Among the more important concessions made by China were those on trucks, buses, passenger cars, tractors, and aircraft. The existing duty of 15 per cent ad valorem on motor tractors, buses, trucks over one metric ton carrying capacity, and chassis for any of the above was bound against increase. A reduction of 16 2/3 per cent was obtained in the duty on trucks not over one metric ton carrying capacity, and on chassis for such trucks. In the case of passenger cars, chassis for passenger cars, and motorcycles, the present duty was bound. The duty on parts and accessories for motorcycles was reduced by 16 2/3

per cent, while the much lower duty on parts and accessories for motorcars and trucks was bound. The revenue duty of 5 per cent on airplanes and parts thereof was also bound. On prime movers, including such items as gas and oil engines, steam engines, and steam and hydraulic turbines, a reduction of 25 per cent was obtained.

CUBA—The rates on passenger cars valued at less than \$2,300 at the factory were reduced from 16 to 26 per cent while the existing rate was bound on automobiles valued at \$2,300 or over. Reductions were secured of 50 per cent on automobile bodies and truck bodies, unmounted, of about 20 per cent on automotive parts and 33 per cent on truck chassis. Duties were lowered substantially on motorcycles and parts, railway passenger coaches, and accessories for pumps and boilers. Moderate reductions were negotiated on many other items in this class, and bindings were granted on a number of low duty items such as agricultural machinery, electrical machinery and apparatus, and tractors and parts.

CZECHOSLOVAKIA—Duty concessions were obtained from Czechoslovakia on passenger cars and motorcycles, light trucks and on airplanes and airplane motors. The duty on motorcycles weighing over 190 kg, each was reduced by 41 per cent; and on passenger cars weighing over 1000 kg, by 35 per cent. The duty on motor trucks weighing up to 1500 kg was reduced by about 10 per cent. Airplanes weighing over 10,000 kg were reduced from 50 per cent ad valorem to 25 per cent, with lesser reductions on lighter planes. The duty on tractors weighing up to 3000 kg was bound against increase.

France Cuts Rates

FRANCE—The duty on automobiles was reduced from 60-65 per cent ad valorem (plus quota restriction) to 35 per cent ad valorem. Duties on automobile parts and accessories, not specified, were reduced to a range of from 11 per cent to 30 per cent ad valorem from a level of from 16 per cent to 97 per cent ad valorem, plus quota restriction. Prewar duties of 46 per cent to 70 per cent on spark plugs and parts were reduced to 25 per cent; the prewar duty on friction linings from 42 to 30 per cent.

INDIA and PAKISTAN—Among the principal United States exports to India and Pakistan are passenger cars and parts. On passenger cars, chassis, parts, and accessories, the nine per cent margin of preference enjoyed by the United Kingdom is to be reduced to six per cent at the end of three years, and eliminated completely at the end of another three years. The duty of three per cent on airplanes, their engines and parts, was bound against increase.

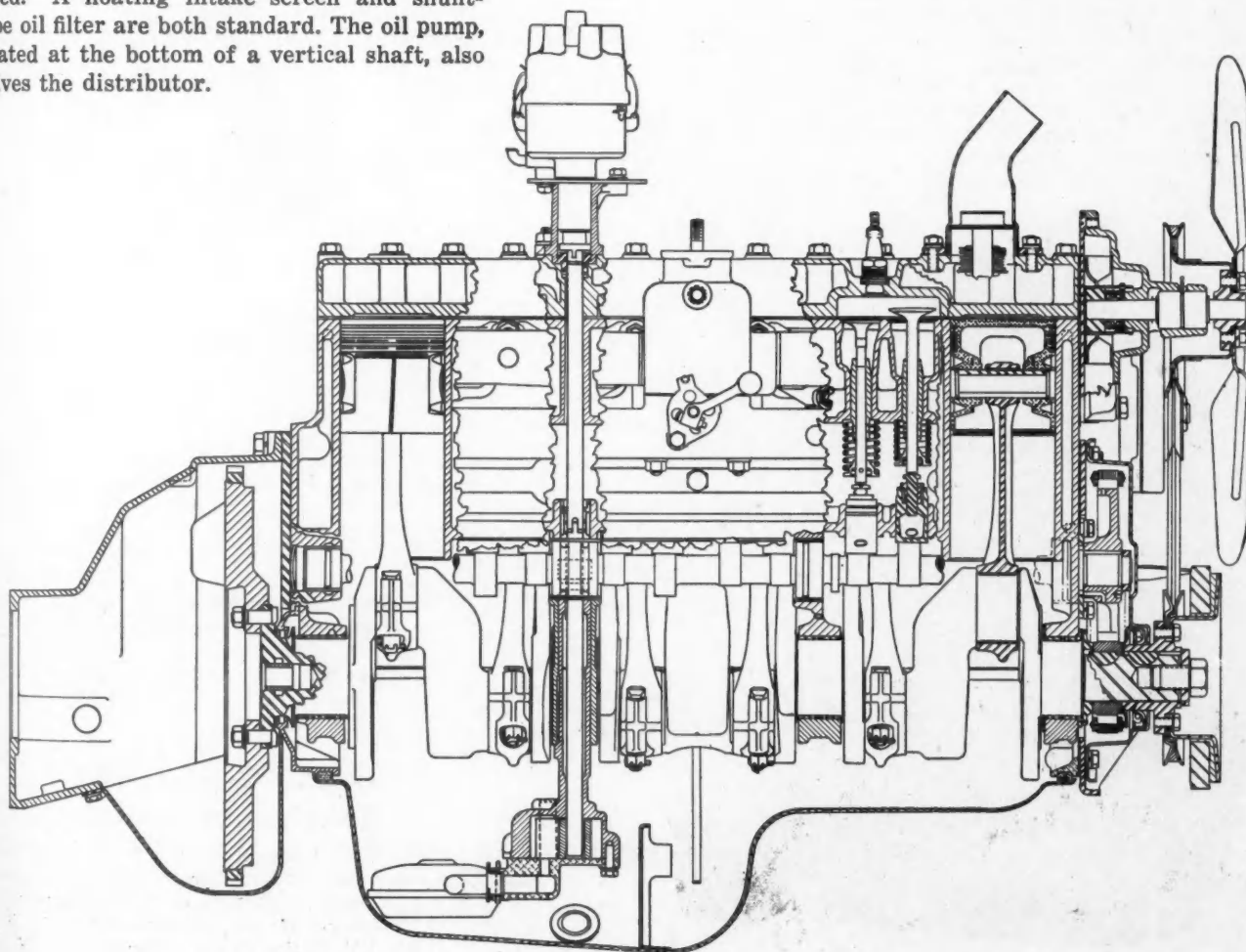
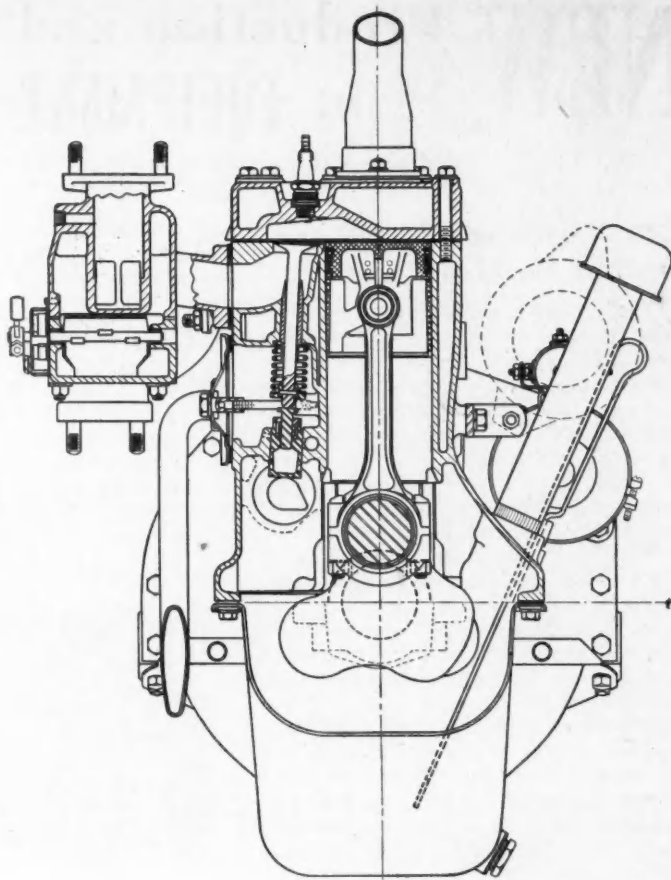
NEW ZEALAND—The import duty on unassembled or completely knocked down (c.k.d.) motor vehicles was reduced from a total of 61¼ per cent (including surtax) to 40 per cent while the duty on other kinds of motor vehicles was reduced from 73½ per cent to 50 per cent. These reductions resulted in a decrease in the margin of preference from 56¼ per cent and 49 per cent to 35 per cent and 30 per cent, respectively.

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Kaiser-Frazer Engine

SHOWN here in longitudinal and transverse cross-section is the engine which powers the Kaiser and Frazer automobiles. It is rated at 100 bhp at 3600 rpm, has a displacement of 226.2 cu in. with 3 5/16 in. bore and 4 3/8 in. stroke, and operates at compression ratio of 6.86 to 1.

The cam-ground steel-strut aluminum-alloy pistons are fitted with two compression and two oil rings. Piston pins are full floating. Connecting rods have lower ends offset slightly to permit maximum main bearing length. Both main and connecting rod bearings are of the precision steel-backed babbitt replaceable type, with the No. 1 main bearing taking the crankshaft thrust. Pressure lubrication is provided for main bearings, connecting rod bearings and camshaft. An unusual feature is pressure lubrication to the valve lifters. Connecting rods have an oil spit hole for added cylinder wall lubrication at low speeds, and the timing chain also is jet lubricated. A floating intake screen and shunt-type oil filter are both standard. The oil pump, located at the bottom of a vertical shaft, also drives the distributor.



NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60

E-209—Special Drilling Machine

The Sommer and Adams Co. Warren, Ohio, has developed a new high-production special processing machine for drilling, reaming and counterboring automobile engine connecting rods and caps. The machine, which is over 11 ft tall and weighs 36,000 lb, is said to produce over 240 drilled, reamed and counterbored assemblies per hour with a single operator.

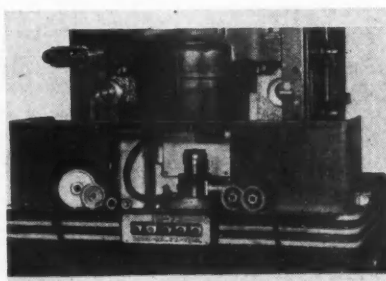
The five-station machine is all push button controlled, and the spindles are controlled for tool set-up purposes through manual controls on each individual station. The machine, which also has an automatic cycle for continuous operation, is equipped with a motor-driven hydraulic unit for indexing and locking the table. The hydraulic system employs a variable-displacement pump which automatically adjusts itself for proper pressure. Each of the five stations has a self-contained hydraulic system. One motor on each unit operates the multiple-spindle drill head through a train of gears, and each head is adaptable for drills, reamers and counterbores. The equipment is supplied with a motor-driven coolant pump delivering 75 gpm.

The electrical control panel operates all motors. Push buttons work on 110 volts, while the motors operate on 220-

volt, 60-cycle, 3-phase current. The equipment is supplied with an automatic lubrication system.

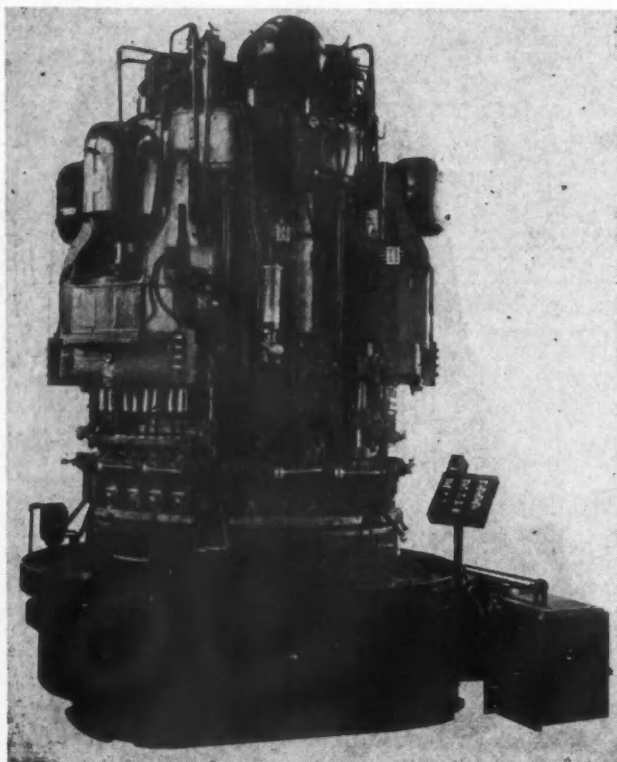
E-210—Shear-Speed Shapers

Availability of its Shear-Speed line of shapers for producing other shapes than gears has been announced by Michigan Tool Co., 7171 E. McNichols Rd., Detroit 12, Mich. Among the various types of parts which can be cut



Shear-Speed shaper

in one set-up on this type of machine are: Cams of various types, including over-running clutches; splines—both straight sided and involute; toothed clutches, ratchet wheels, sprockets and many types of miscellaneous special external forms.



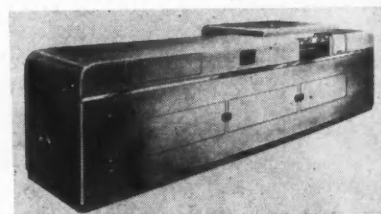
Sommer and Adams machine for drilling, reaming and counterboring connecting rods and caps

The company points out that the Shear-Speed machines will cut almost any external shape which can be produced "internally" by broaching. Such shapes are cut by formed tools which feed in radially from all sides during the cut. The work is reciprocated on this machine, while the tools are fed in to correct depth. Tools are automatically retracted for relief on the return stroke. Feed is automatically adjusted during the cutting cycle to approximately balance the cutting load on each stroke. Thus a fairly coarse feed is used during the first strokes, while the tools are entering the cut, while the feed becomes finer as more and more of the cutting edge of the tools is being employed.

Parts up to 10 in. diameter and 2 3/4 in. face width can be handled on the present line of Shear-Speed machines. For narrower faced parts, several may be cut simultaneously, as long as the total face width limitation is not exceeded. Complete cutting cycle time normally ranges from 13 to 50 seconds per piece, depending on the amount of stock to be removed.

E-211—Automatic Cutting Machine

An automatic, electronically-controlled tungsten cutting machine has been brought out by Shurhit Products, Inc., Waukegan, Ill. The machine can



Shurhit cutting machine

also be applied for precision segment cutting of metals and materials other than tungsten.

The machine, 8 ft by 4 ft by 3 1/2 ft, features accurate parallelism of cut surfaces within .0005 in., uniform accuracy in the thickness of cut pieces between parallel cut surfaces within .001 in., and cuts without producing burrs on the parallel cut faces.

The Shurhit is provided with automatic, uniform, and infinitely adjustable feed pressure, means of automatically varying speed and length of stroke, and other built-in features which make the machine suited for high rate production of precision segment cutting from bar or rod stock.

E-212—Cabinet with Temperature Control

For determining the physical properties of plastics in tension, compression and flexure over the specification range of temperatures of -70 F to 170 F, the Baldwin Locomotive Works,

Now Available for EARLY Delivery*

J&L ELECTRICWELD TUBING

*For parts that are
strong and light*



**J&L
STEEL**

You can reduce excess weight, cost of material and extend the service life of many items with J&L Electricweld Tubing. It has the strength to do the work of heavier sections—the ductility to give you ease of fabrication in your plant.

Write today for technical bulletin giving you complete information on J&L Electricweld Tubing and how it can be applied to improve your products at less cost.

★ Due to an extensive plant expansion program J&L Electricweld Tubing is now available for early delivery.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

December 1, 1947

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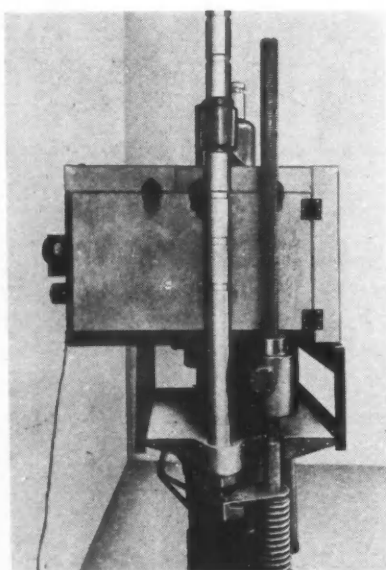
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Philadelphia 42, Pa., has developed a new temperature-controlled cabinet for use on standard Baldwin-Tate-Emery testing machines of 60,000 and 120,000 lb capacity.

The working chamber of the cabinet, approximately 19 in. wide, 18 in. high and 20 in. deep, accommodates Templin type specimen grips of 5000 lb capacity, a sub-press for compression testing, flexure tool, standard strain followers for either Templin or Microformer type recorders, and associated equipment. Standard 2-in. gage length tension test specimens, compression specimens 2 by 1/2 by 1/2 in., or flexure test specimens up to 16 in. span by 2 in. wide and 2 in. thick can be tested in the chamber. The chamber permits a deformation of 2 in. in the tension and flexure specimens.

Behind the working chamber is a servo unit consisting of a dry ice container, a mixing chamber, fan for air circulation, heater coils and electric temperature control equipment.

The cabinet, which is 27 by 27 by 40 in. overall, is constructed of polished stainless steel with 4 in. of thermal insulation. A hinged door and removable top in two sections give access to the interior of the cabinet. Tests can be observed through a double-glazed plate glass window in the door, and two hand holes with insulated sleeves permit manipulation of apparatus in the chamber during tests without opening the door.

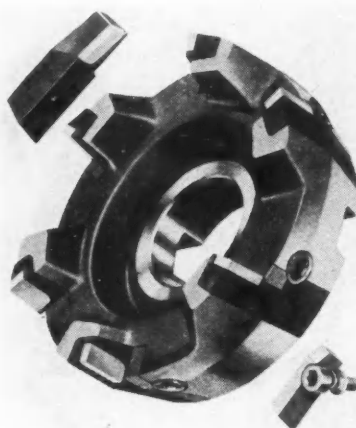


Baldwin temperature-controlled cabinet mounted on a Baldwin-Tate-Emery testing machine of 60,000 lb capacity for a tension test

E-213—Standard Face Mill

The Gairing Tool Co., Detroit, Mich., has recently developed a new carbide face mill in standard sizes 5-in. dia and over, known as the Gairing E-Con-O-Mill. The same blades and locks fit all sizes of cutter bodies.

The conetype bodies give full-height support to the blades, provide greatest unobstructed chip clearance. Slots are cut to such close tolerances as to per-



Gairing E-Con-O-Mill

mit replacing individual blades without regrinding the entire cutter.

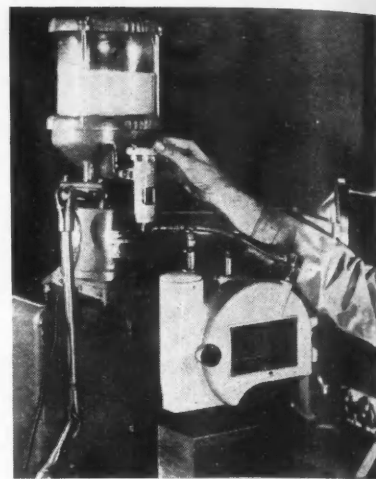
Blades, of the square tool-bit type, are furnished with all clearance angles ground to a gage, ready for work. They may be individually re-sharpened on a wet carbide grinder. Blades are made in three types, with different radial rakes for steel, for cast iron, and for non-ferrous materials. They all fit the same cutter bodies.

Locks are assembled in one piece and remain attached to the body when changing blades.

E-214—Coolant Device For Grinders

"Cool Grinding" as named by The DoAll Co., Des Plaines, Ill., introduces a new method of cooling work when being ground on any grinder. The introduction of coolant directly at the point of contact between wheel and work is the principle of "Cool Grinding."

The "Cool Grinding" unit consists of a coolant reservoir mounted on the spindle column, a sight drip valve and a special wheel adapter. The coolant is fed from the reservoir at a rate of from one to four drops a second depending upon the material being ground.



"Cool Grinding" unit

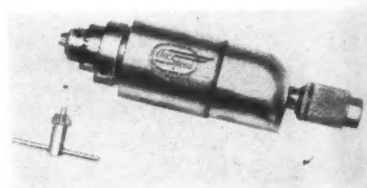
The coolant is directed into the front of the special wheel adapter where it enters the arbor hole of the grinding wheel. Since the grinding wheels used in "Cool Grinding" have no lead or ceramic the coolant enters the wheel at the inside and is thrown by centrifugal force to the outside grinding face of the wheel.

This unit is available at the present time as an attachment for DoALL 6 in. by 18 in. surface grinders. However, the "Cool Grinding" unit will soon be offered for other makes of surface grinders, as well as for bench, cylindrical, centerless, and internal grinders.

E-215—Air-Powered Hand Drills

A straight type and a pistol-grip type of air-powered hand drills are being distributed by Air-Speed Tool Co., 1500 W. Slauson Ave., Los Angeles, Calif.

Controllable speed regulation, simplicity of design, rugged construction,



Straight type Air-Speed drill

high speed, light weight and cool operating characteristics are features of the new Air-Speed drills, according to the manufacturer. The tools are designed to operate efficiently at air pressures of 90 to 100 psi. Air consumption is estimated at 12 cfm at drill speeds of 14,000 rpm.

E-216—Three-Dimensional Pantograph Machine

The Gorton P13 three-dimensional pantograph machine is a recent development of the George Gorton Machine Co., 1131 W. 13 St., Racine, Wis. In size, work holding capacity and metal removal ability, it is directly compar-

*Another New Britain
Automatic with*

**initial
and
permanent
accuracy**

A NEW LINE OF PRECISION CONTOUR TURNING AND BORING MACHINES

Accurate and Fast — Cam and Air Actuated

Featuring 1. An endless variety of contours or combinations may be generated with a single-point tool. Besides all the regular jobs of straight precision boring and turning, facing and chamfering, it will produce lands, recesses, flanges, steps, counterbores, and radii.

2. A disc type cam for each table gives positive action consistently throughout the day — from the first to the last piece — uninfluenced by temperature changes.

3. Through positive cam action, tool approaches on rapid traverse to within .005 of the work and immediately starts to feed. Tool may cut on feed-in or drawback stroke, or both for rough and finish cuts. On return stroke, tool jumps clear eliminating drag off marks. When moving between intermittent or successive cuts, tool goes into rapid traverse.

4. Uniform temperature, anti-friction bearings, and super-precision spindles provide spindle speeds up to 7,500 RPM. Mechanical precision chucking operated by air cylinders. Neither chucking nor unchucking operation affects preload or position of spindle bearings.

5. Only one dimension need be inspected on any one set-up, regardless of the number of diameters produced by any one single-point tool. Cams control and positively repeat from piece to piece.

6. Set-up of machine depends entirely upon nature of job. Work may be rotated in spindles or mounted on table, loaded from the front of the spindle or through the spindle. Spindles may be raised, lowered, or separated. Two spindles are standard, but more may be added. Changing job set-up simply requires replacing two cams, setting tool for size and changing chucks.



Model 36



THREE OTHER NEW MACHINES

Latest additions to the New Britain line include: The new, faster, more powerful line of automatic screw machines designed to make the most of carbides on long and short runs, the Model 365, tool rotating, double end chucking machine — and the new line of automatic turret lathes.

M-01084

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN-GRIDLEY MACHINE DIVISION
NEW BRITAIN, CONNECTICUT

December 1, 1947

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able to the Gorton 3-U two-dimensional pantograph and it also incorporates the same reduction ratios with the exception of 1:1.

In developing the P13, an improvement in design was made which is said to simplify and improve the operation of this machine. The Gorton Ratiobar, supported at either end by the over-arm, aligns the pivot center, cutter spindle and tracing style in a straight line. Another feature of the Ratiobar is that there is only one slider block to adjust for whatever reduction ratio is desired.

The Ratiobar is an aluminum alloy casting pivoted horizontally on which are mounted two hardened and ground steel tracks. The tracer style and cutter spindle float on precision ball bearings which travel in these tracks. The Ratiobar carries the weight of the entire pantograph mechanism.

This three-dimensional machine employs an enlarged three-dimensional master, or pattern, which is mounted on the copy table. The surface of this master is traced in three dimensions manually with the tracing style while the cutter reproduces, at the desired ratio of reduction on the work piece, all of the angles, curves and surfaces of the master.

According to the manufacturer, the P13 is ideal for cutting small precision

embossing dies calling for fine details. This machine is also easily adapted for general two-dimensional light milling and engraving. When used with the Gorton roll attachment, light milling and engraving can be done on cylinders, rolls, tubes, dials or on any peripheral surface.

E-217—Two New Heliwelding Units

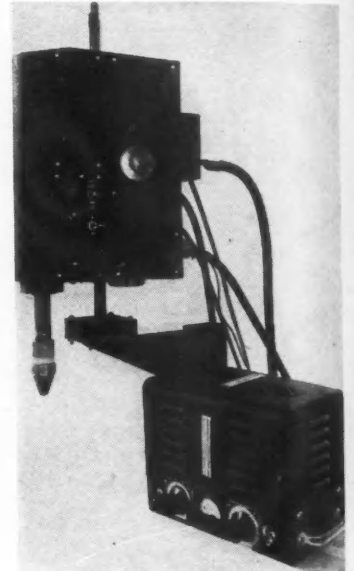
The Air Reduction Sales Co., 60 E. 42 St., New York, N. Y., is marketing two new Heliwelding units—a machine type electrode holder and an automatic unit—for the high speed, high quality welding of the light metals such as stainless steel, aluminum and magnesium. The Heliweld machine holder was designed for mounting on a Radiograph or other suitable travel mechanism for moving along the joint or for fixed position use with the work moving beneath the arc. It has the same barrel and rack as standard 1½ in. diameter machine gas cutting torches.

The Airco automatic Heliweld unit, designed for continuous operation, consists of a holder, holder carriage and a control box. It is fully automatic and electronically controlled. The outstanding feature of this equipment is that it automatically maintains constant arc length. By compensating for set-up ir-

regularities it is said to assure a continuous weld of consistent dimensions and quality.

Both units have a welding current capacity of 300 amp and are fully insulated for the high-frequency current which is often required for arc-starting and stabilization in welding.

The machine holder may be used with either a-c or d-c welding current while the automatic unit, because of



Airco Heliwelding unit

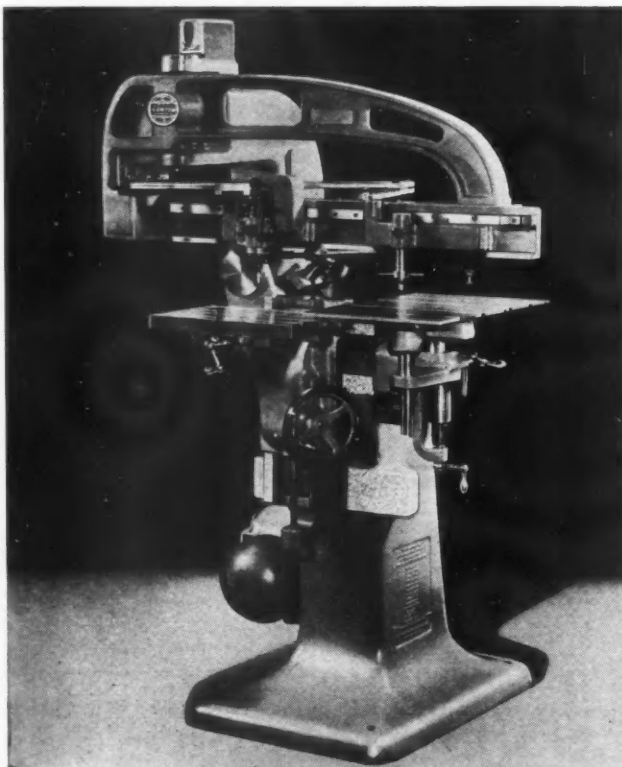
the nature of its electronic circuits, operates on d-c only.

Although both Airco Heliweld units were designed for high-speed production work, each has its own particular application. Where production requirements and the nature of the work permits, the machine equipment will prove completely satisfactory, according to the manufacturer. Where the work has inherent irregularities or where the arc length is particularly critical, the automatic unit is to be used.

The Heliweld holders supplied with both types of equipment are virtually identical. The holder is water-cooled, features an all-plastic exterior and is completely insulated. It weighs 28 oz. and is approximately 10 in. long. A group of orifices surrounding the electrode controls the flow of shielding gas to provide complete shielding. The holder takes tungsten or carbon electrodes up to 3/16 in. diameter.

E-218—Narrow Spot Welder

A new narrow spot welder has been developed by the Metron Instrument Co., Denver 9, Col. Suitable as a general purpose bench mounted welder, or ganged for multiple production, this automatic spot welder is complete in itself. Although only four in. wide, each unit incorporates controlled air-operated electrode pressure, adjustable current setting, electronic timing, water cooling of the transformer and electrodes and automatic pressure initiation



Gorton P13 pantograph machine

Shears cutting armor plate, 300-400 Brinell. Holdowns are hydraulically operated. Wherever used, *Texaco Regal Oils (R & O)* keep hydraulic systems free of rust, sludge and foam, prevent costly stoppages.

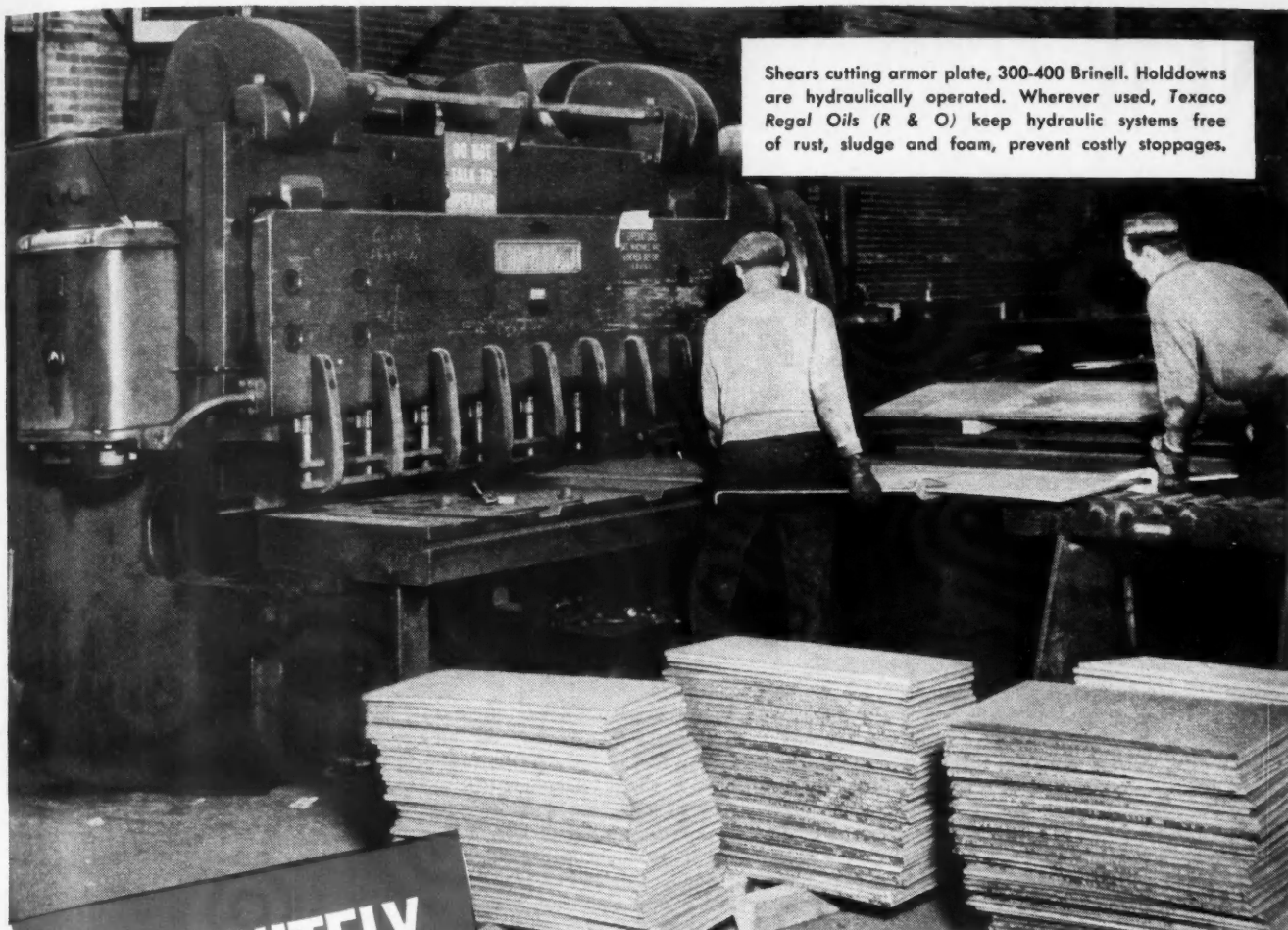


Photo courtesy of The Cincinnati Shaper Co.

A "DEFINITELY BETTER" WAY...

to prevent rust and sludge in hydraulic systems

DON'T let improper hydraulic fluid plug up your hydraulic mechanisms — keep them free of rust and sludge by using *Texaco Regal Oils (R & O)*. These are turbine-grade oils effectively inhibited against rust and oxidation (the cause of sludge), and specially processed to prevent foaming.

From plants everywhere come reports of lower maintenance costs and smoother hydraulic operation for longer uninterrupted periods with *Regal Oils (R & O)*. As one user expresses it, "They are

definitely better than other oils."

Texaco Regal Oils (R & O) are recommended by leading hydraulic equipment manufacturers—many of whom ship their units already filled with them.

Whatever the type or size of your hydraulic units, there are *Texaco Regal Oils (R & O)* in the suitable viscosities to assure their efficient operation. For full information, call the nearest of the more than 2500 Texaco distributing plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, New York.



TEXACO Regal Oils (R&O)

FOR ALL HYDRAULIC UNITS

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Sunday night. • METROPOLITAN OPERA broadcasts every Saturday afternoon.

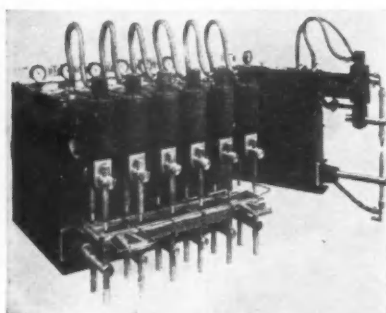
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of current. A small foot-actuated air valve controls the complete welding sequence. Electrode pressure is adjustable from nothing to approximately twice the air line pressure. Welding current is automatically applied after the electrode pressure has reached a predetermined pressure setting which is adjustable from nothing to approximately 90 psi in cylinder pressure. The built-in electronic timer controls the current duration from 1/30 second to two seconds. A four-position head con-



Metron welders

trol switch provides adjustment of current for light and heavy work. All controls are on the top surface.

Nominal rating of the transformer is eight kva, however, the units will weld two pieces of 12 gage steel. Units are normally supplied for 220 volts 60 cycle operation although they can be supplied for 440 volts. Dimensions are four in. wide, 32 in. deep and 24 in. high with a 12-in. throat.

E-219—Two-Pad Sander

National Air Sander, Inc., Rockford, Ill., is introducing a new two-pad reciprocating-type sander which will be ready for delivery early in 1948. This light-weight sander weighs only 5½ lb. Its two pads operate in a straight line reciprocating action with a stroke of 1½ in. Vibration is practically elimi-



National reciprocating-type sander

nated by the opposed action of the pads.

With this machine the manufacturer offers a group of accessory pads enabling its adaption to sanding, rubbing and polishing applications on large or small, curved or flat surfaces, on metal wood, or plastic. The machine is provided with an automatic feed for water or cutting agent.

E-220—Improved Cleaning Machines

The Equipment Division of the Magnus Chemical Co., Inc., Garwood, N. J., has recently re-designed and increased with new models its line of Magnus Aja-Dip cleaning machines.

The outward appearance has been streamlined, with grouped control and instrument panel. The drive mechanism is entirely located in the front of the machine for easier access.

Cleaning with the Magnus Aja-Dip machines is fully automatic and thorough, requiring labor only for loading and unloading.

Magnus Aja-Dip cleaning machines are available in 13 sizes and types



Magnus Aja-Dip cleaning machine

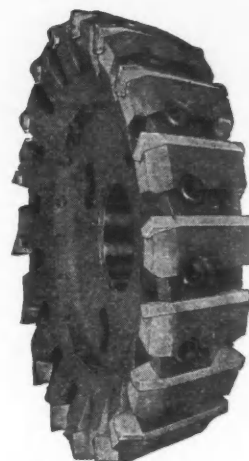
from the Midget type handling a few pounds of work to the Jumbo type handling 2200 lb at a time. They may be used with either hot or cold cleaning solutions. If heated, heat may be by steam, electricity, oil, gas or kerosene.

E-221—Milling Cutter

Kennametal Inc., Latrobe, Pa., has just introduced its "Axial Face Kennamill" designed especially for production milling of cast iron, and suitable for light to medium cuts on solid or cored castings.

This new mill incorporates the advantages of solid blade face mills with maximum number of blades.

Set up is said to be easy as blades can be assembled to within a few thousandths on the face and periphery, and they do not move during tightening. Sharpening is simplified because of the open construction of the cutter



Axial Face Kennamill

and because there are only three surfaces to grind.

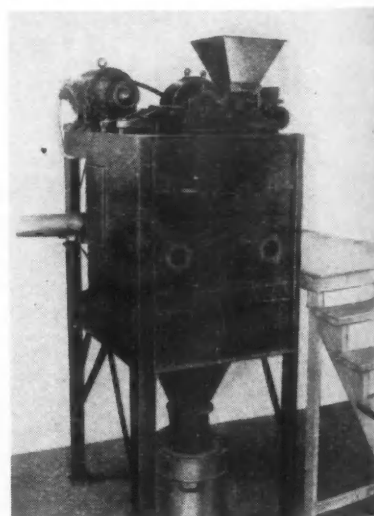
The cutter can be mounted on all common spindles with bolt circle provided to order. The body is shaped to permit grinding a 45 deg corner angle for milling light cored sections, and is sufficiently over nominal diameter to cut full width when so ground.

Five sizes are now available; 6 in., 8 in., 10 in., 12 in., and 14 in.

E-222—Dust Collector

Pulverizing Machinery Co., 101 Catham Rd., Summit, N. J., has designed and is manufacturing a dust collector known as the Mikro-Collector. According to its manufacturers, the Mikro-Collector's unique contribution lies in the application of hard-pressed wool felt as a filter medium in industrial air and gas filtration. The manufacturer claims 99.99 per cent minimum recovery of most solids. In almost all instances, it is said, the loss is so infinitesimal that recovery is virtually 100 per cent.

In the standard, single bag collectors made by the company, the cylindrical felt bag is centered in a steel, or aluminum housing. Either positive or negative pressure may be used to induce the air-flow through the bag.



Mikro-Collector

EXIDE BATTERIES...as dependable as the Diesel Engines they crank

Exide Batteries have the *extra power* required to deliver the *extra speed* that Diesel engine cranking demands. They are ruggedly built to withstand the rigors of all climates and to assure trustworthy performance in all types of service...even where operating conditions are exceptionally severe.

Exide Batteries are cranking Diesel-powered trucks, buses and off-the-highway equipment. They are giving a good account of themselves in Diesel-electric locomotives, on ships, in power plants and many other

applications. And wherever used, Exide Batteries are serving with dependability, long life and ease of maintenance.

Write today for a FREE copy of the Exide Catalog on Heavy-Duty Batteries. It gives you catalog data and information on how to get the most from your Diesel Cranking Batteries.

Exide

BATTERIES

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THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto

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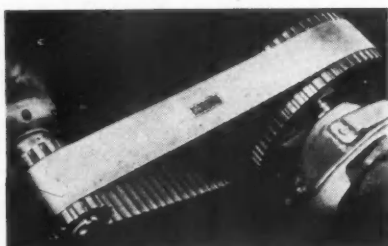
NEW Products

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F-150—Belt with Rubber Teeth

A belt with rubber teeth that will not slip is announced by the L. H. Gilmer division of United States Rubber Co. The new belt is said to be strong, highly flexible and virtually noiseless in operation. It is designed for use on machinery equipped with special pulleys grooved to fit the teeth.

The belt is reinforced with steel cables embedded in oil-resisting synthetic rubber. The cables reduce stretch almost to zero, eliminating the



Gilmer timing belt

necessity of take-up devices. In operation, the belt makes positive engagement with the pulleys at any speed up to 10,000 fpm.

Known as the Gilmer timing belt, the new product will be made in various sizes to meet the requirements of machine designers. It is suitable for power transmission and synchronization in the automotive and aviation fields and on machine tools and industrial equipment.

F-151—New Alloy for Piston Rings

All compression rings in the American Hammered piston ring line will be made of a new type of metal, according to an announcement by the Piston Ring Division of the Koppers Co., Baltimore, Md.

Known as F-88 High Strength Iron, it is a centrifugal casting of a special formula developed by American Hammered. This metal is two and one half times stronger than ordinary piston ring iron, is unbreakable in service and has a remarkable high modulus of elasticity, according to the manufacturer. It provides the reserve energy so necessary in a compression ring. The new metal is being used first in the production of certain selected ring sizes and will be applied to the balance of the line progressively as production facilities permit.

Physical properties of F-88 high strength iron are: Min. tensile str—88,000 psi; min elastic modulus—20 x

10⁶; comparative impact strength—10 in-lb; hardness (Rockwell C) 24-30.

For heavy duty engines, the new F-88 development is being combined with porous chrome plating.

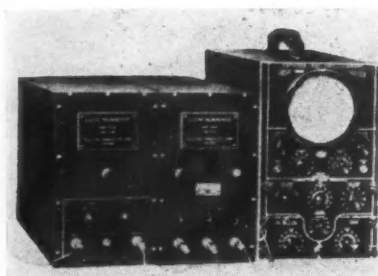
F-152—Flux for Welding Stainless Steel

The Air Reduction Sales Co., New York, N. Y., has recently brought out a new flux for the oxyacetylene welding of stainless steels and high chromium bearing alloys. The flux has been designated as Airco Formula No. 34.

The new flux was specifically compounded to dissolve the chromium oxides encountered in welding stainless steel and other high chromium bearing alloys. Application by painting the immediate and surrounding surfaces to be welded protects the molten metal from the air, thus preventing oxidation.

F-153—Improved Pressuregraph

To the other "inside views" of what goes on in an internal combustion engine in operation, the new Syncro-Marker Pressuregraph, made by Electro Products Laboratories, 509 W. Ran-



Syncro-Marker Pressuregraph

dolph St., Chicago, Ill., adds a record of the rate of flame propagation.

Tracings on the cathode ray oscillograph used with the Syncro-Marker Pressuregraph show clearly, and by curve, revealed in terms of pressure versus angular velocity expressed by 5 deg markers or pressure time in milliseconds, the exact rate of flame propagation during explosion, in the range from top dead center to peak pressure.

F-154—Solvent for Cold Immersion Cleaning

A new Gunk solvent, X-5, has been developed by the Curran Ordnance Chemical Laboratories, Lawrence, Mass., for use in large, cold immersion tanks. The product was formulated as a pre-cleaning solvent and has for

its purpose the cleaning of heavily encrusted engine blocks and similarly difficult-to-clean large parts prior to a final quick dip in GUNK Hydro-Seal which leaves the parts bright-metal clean. The new solvent is reported to be available only in 50-gallon drums since it is exclusively designed for use in filling large, cold immersion tanks.

F-155—Solder Feeding Attachment

The new "Solder-Matic" solder feeding attachment made by Nelpin Manufacturing Co., 45-17 Davis St., Long Island City 1, N. Y., feeds solder at the touch of the finger-tip and clamps to any standard electric soldering iron.

Solder in short lengths, in small coils,



Solder-matic attachment

or fed from a spool as large as 25 lb, can be handled by the new "Solder-Matic." It takes solder from 1/16 in. to 3/16 in. in diameter, and feeds up to 3/16 in. per stroke. Screw adjustment of the stainless steel nozzle guides solder exactly where needed, regardless of the size or shape of the particular soldering tip being used. Lightening holes in the "Solder-Matic" cut weight and assure cool operation.

F-156—Heat-Resistant Metal

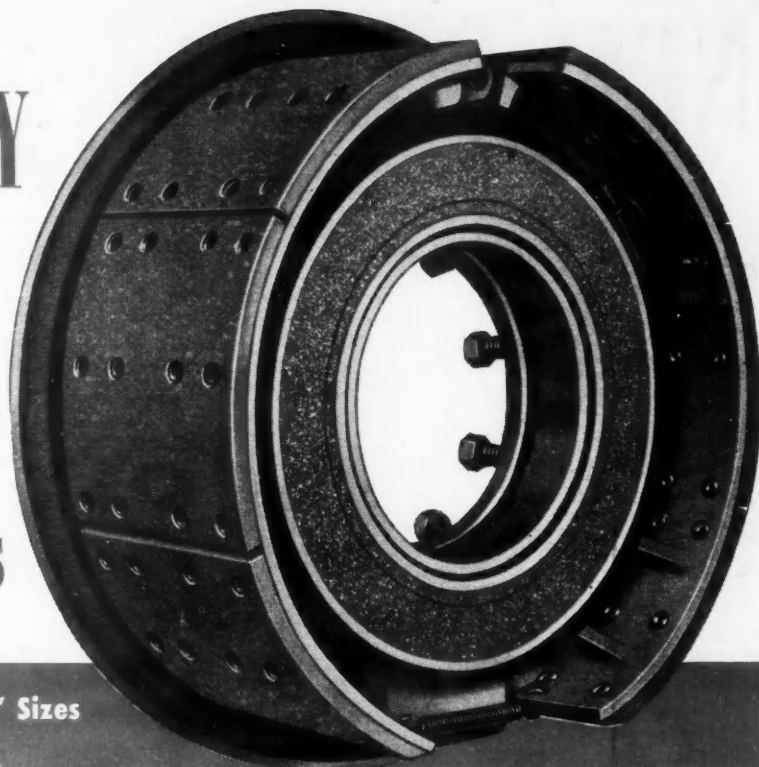
A very hard metal that retains its strength and resistance to corrosion at high temperatures has been added to the line of Kennametal, Inc., Latrobe, Pa.

This is a special "cemented carbide" composition manufactured by processes similar to those employed in making the carbides now used for cutting tools and wear-resistant parts, but with unique properties. The maker states that it withstands temperatures that rapidly destroy conventional carbides and the best cast alloys; resists thermal shock much better than ceramics; and has a specific gravity about one-third that of tungsten carbide, and two-thirds that of steel. Pieces of this Kennametal composition, Grade K138,

REVOLUTIONARY ADVANCEMENT*

in

WARNER ELECTRIC BRAKES



NEW
NEW

16½"x5", 16½"x6"**, 16½"x7" Sizes

Two-Shoe Construction

NEW

For More Effective Stopping Power!

These big, new, powerful Warner Electric Brakes — with their two-shoe hinge construction, incorporate the most modern and advanced brake engineering — and provide an entirely new concept of *effective stopping power*.

INSTANTANEOUS, POSITIVE ACTION As with all Warner Electric Brakes, positive-acting braking power is developed within the brake itself. Because the braking mechanism is *electrically controlled*, there is no time lag. Regardless of distances from cab to rear trailer wheels, any amount of stopping power is *instantly available*. Even with this remarkably fast action, the larger, wider, two-shoe brake operates with velvety smoothness never before achieved in brakes of any other type.

UNMATCHED ECONOMY The new Warner Electric Brakes are inexpensive to install. Use only as much current as a tail light. Require minimum servicing thus preventing costly delays and tie-ups of equipment.

CONTROLLED BRAKING POWER Driver can pre-set "Vari-Load" dial on dash to meet load and road conditions.

SYNCHRONIZED OPERATION WITH EITHER AIR OR HYDRAULIC SYSTEMS Warner Controller synchronizes hydraulic, vacuum or air brakes on tractor with Electric Brakes on trailer. Regular tractor foot pedal then operates both systems *together*.

ASSURED DEPENDABILITY The new two-shoe Warner Electric Brakes assure years of dependable operation. Warner Electric Brakes have been performance-proved by leading tractor-trailer operators during many years of efficient, trouble-free service.

GREATER SAFETY When both the tractor and trailer are equipped with Warner Electric Brakes their *instantaneous "stopping power"* under *absolute control* assures greater safety. All brakes "come in" at the same instant, but with varying *amounts* of power. Therefore, rear trailer wheels get the *effect* of coming in first — and the tendency to skid or jackknife is prevented, thus giving greater protection to the driver and load — and avoiding costly repairs or tie-up of equipment.

For maximum performance and satisfaction, standardize on Warner Electric Brakes. Write for illustrated literature explaining all their many advantages.

WARNER ELECTRIC BRAKE MFG. CO.
BELOIT, WISCONSIN

Specialists in the manufacture of Electric Brakes since 1927

REVOLUTIONARY ADVANCEMENT

More rugged construction, rigid shoes, longer lining life, smoother control and dependable performance under severe conditions.

No other brakes equal the new Warner Electric Brakes for simplicity of design and construction. Full clearance under tractor and trailer — nothing to get knocked off, leak, chatter or freeze. No exposed braking equipment — no rods to rattle — no tubes to split — no troublesome boosters and hose connections. One rugged all-purpose Electrical Cable Connection provides contacts for brakes, running lights, parking lights, stop and turn signals — ALL electrical contacts. As easy to plug in as a radio.



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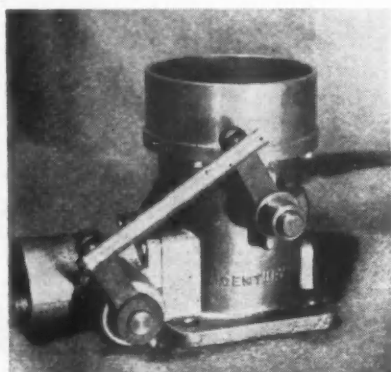
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have been heated to 2100 F for 48 hours without loss of strength. Neither does it change appreciably when heated to 1800 F and quenched in water. Air cooling from the same high temperature leaves no effect other than initial discoloration of the surface.

F-157—Carburetor for Gaseous Fuels

A new carburetor for gaseous fuels, known as Century 3C, is being placed on the market by Century Gas Equipment Co., 11188 Long Beach Blvd., Lynwood, Calif. It is a metering valve carburetor in that it proportions air to the fuel. The metering feature is through its positive hookup of the throttle so that every movement of the throttle moves the metering valve to maintain the correct proportions of fuel.

This carburetor is made to start on a closed throttle, and is said to be ideal



Century 3C carburetor

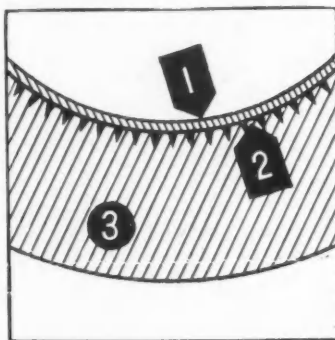
for engines where the throttle can be closed for starting. It is manufactured for automotive or truck engines, and industrial engines where the governor is not attached to the carburetor throttle.

F-158—Improved Gridded Bearing

To provide additional seizure resistance and corrosion resistance for its gridded bearings, the National Bearing Division of the American Brake Shoe Co., St. Louis 10, Mo., has added a 0.002-in. run-in surface of lead-tin electroplated in the bore. The cross-section appearance of this three-layer bi-metallic construction is shown in the illustration.

Present applications of gridded bearings are main and connecting rods of heavily-loaded Diesel engines and similar heavy-duty service. They are now operating under loads of over 3,500 psi projected area, with shafts as low as

160 Brinell hardness. Minimum depth of grids is .008 in.; minimum area of babbitt is 40 per cent. The required balance of conformability and embeddability for individual applications is ob-



Cross section of N-B-M gridded bearing, showing (1) .002-in. leadtin alloy "run-in" surface (2) Precision-spaced grids filled with N-B-M silver babbitt; (3) Centrifugally-cast lead-bronze shell

tained by controlling the proportion of land (the parent bronze) and the babbitt-filled grid.

N-B-M Gridded Bearings are customarily made as half bushings, but can be furnished as full cylindrical bearings if desired.

F-159—Solenoid Valve

A new solenoid valve has been introduced by Waterman Engineering Co., 721 Custer Ave., Evanston, Ill. It is said to be an inexpensive, compactly-built unit for all hydraulic systems, or for the handling of any non-corrosive fluids. It has a maximum working pressure of 3000 psi, and electrical requirements of 6, 12, 24 or 36 volts d-c, with current consumption of 2.3 amp at 12 volts. It locks the fluid in one direction and permits free flowing in the other direction. This valve is also available with integral flow rate regulation.

F-160—Gasket Centering Tool

A new cylinder-head gasket centering tool is available for immediate delivery according to Felt Products Manufacturing Co., Chicago, Ill. This new tool is said to simplify, as well as speed up cylinder-head gasket installations by means of threaded, easily retractable centering plugs.

With the new Fel-Pro tool, the mechanic spins one of the two removable centering plugs into the front and rear of the motor block. Next, he places the head gasket over the plugs, automati-

cally locating it perfectly in place. With the head in this exact position, the mechanic inserts a few bolts before spinning out the plugs with the Fel-Pro gasket centering tool. Fel-Pro gasket centering tools come in sets of one 7/16 in. and one 1/2 in. tool.

F-161—New U. S. Tire

Developed for use as original equipment on new cars and featuring a new tread design, a new tire made by the United States Rubber Co. is now available to the public. Although it made its initial appearance recently on new vehicles, it will henceforth be retailed as the regularly-priced, U. S. Royal DeLuxe automobile tire.

The tire's flatter tread profile is said to assure longer wear than previous standard-priced U. S. tires. It has eight rows with hundreds of extra gripping edges designed to check skids in any direction. Tire noise is reduced by a staggered design of safety blocks.

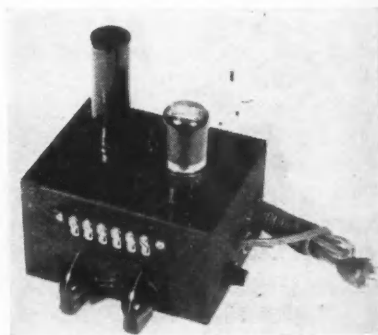
Wide outside ribs and narrow center ribs are featured in the new tire. This construction is designed to cut wind drift and improve stability while creating a softer road contact area and increasing flexibility.

The new tire is being produced in practically all popular sizes. Rayon cord is used in the larger-sized casings.

F-162—Repeat Cycle Timer

G. C. Wilson & Co., 2 N. Passaic Ave., Chatham, N. J., are introducing a repeat cycle timer for process control as well as life testing and laboratory use.

Independently variable "on and off" intervals ranging from 0.1 second to 4.0 minutes are available. Complete



Wilson repeat cycle timer

adjustability is provided. Wide variations in line voltage have only a minor effect—less than one per cent—on the timing intervals. Means are provided for synchronizing the timer cycle with other equipment.

Relay contacts having up to two transfers (double pole, double throw) each rated for 10 amp at 115 volts a-c can be provided.

Operation is from 115 volts, 60 cycles. Timers for operation from 115 volts d-c can also be provided, if specified.

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78

PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

D-126—Non-Ferrous Metals

The Wellman Bronze & Aluminum Co.—A revised edition of the Wellman non-ferrous castings and patterns catalog, giving helpful metals' data, has been issued. Tables cover relative weights of structural metals; physical and mechanical properties of cast metal; chemical compositions and mechanical properties of magnesium, aluminum and copper-base alloys and Ampco Metal; conforming specifications, etc.

D-127—Abrasive Grinding Wheels

Bay State Abrasive Products Co.—A new 3-color, 4-page folder and price list gives a complete detailed and pictorial description of the company's Bayflex Raised Hub Disc Wheels, their uses and advantages. It contains insert pages which give complete tables of discounts, standard ordering quantities and list prices.

D-128—Torque Converter Tractor

Allis-Chalmers Mfg. Co., Tractor Div.—A 6-page folder describes the company's new HD-19 Torque Converter Tractor. A 3-page center spread

lists many of the new unit's prominent features, such as weight, net engine horsepower and its hydraulic torque converter drive. Illustrations of the tractor's operator platform, its 6-cylinder instant starting GM engine and a cut-away-view of the Positive Seal truck wheels are included, together with a full page of specifications relative to engine construction, steering design, speeds, and drawbar pull, etc.

D-129—Heliweld Equipment

Air Reduction Sales Co.—A new, 2-color, illustrated folder describing its three new types of Heliweld equipment, the manual holder, the machine holder and the electronically controlled automatic head, has been published. It includes photographic illustrations of the three types, lists advantages and uses of the process, construction details of the equipment and devotes a page to supplementary equipment and supplies.

D-130—Centrifugal Blowers and Exhausters

United States Hoffman Machinery Corp.—The Air Appliance Div. of the company has published a new 12-page booklet, A-650, which describes many applications of Hoffman Blowers and Exhausters on production operations.

Design features are explained and operating characteristics and advantages are described. The booklet includes charts showing capacity ranges and a "Handy Data" page of tables, conversion factors and graphs to aid in determining blower or exhauster requirements.

D-131—Taps and Dies

The Charles L. Jarvis Co.—A 12-page catalog, describing the Jarvis-Dowding line of taps and dies, has been issued. It lists complete specifications of all standard taps and dies in the company's line and provides a data sheet for ordering or for specifying requirements for specially designed and engineered Jarvis-Dowding taps and dies for unusual or difficult needs.

D-132—Heat Treating

Eastern Heat Treating & Brazing Corp.—A Condensed Guide to Heat Treating contains information on heat treatment by high frequency induction; brazing by induction heat; definitions and terms; SAE numbering of steels; elements in alloys; hardness conversion table; temperature scale, etc.

D-133—Die Heads

The Geometric Tool Co.—Bulletin DS-3 describes and illustrates the company's new improved Style DS Convertible Self Opening Die Head, which is four die heads in one and can be used in four different applications by a simple adjustment for each. The outstanding features are listed and complete specifications are included.

(Turn to page 94, please)

TIME SAVER COUPON for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above OR New Production and Plant Equipment OR New Products items described on following pages.

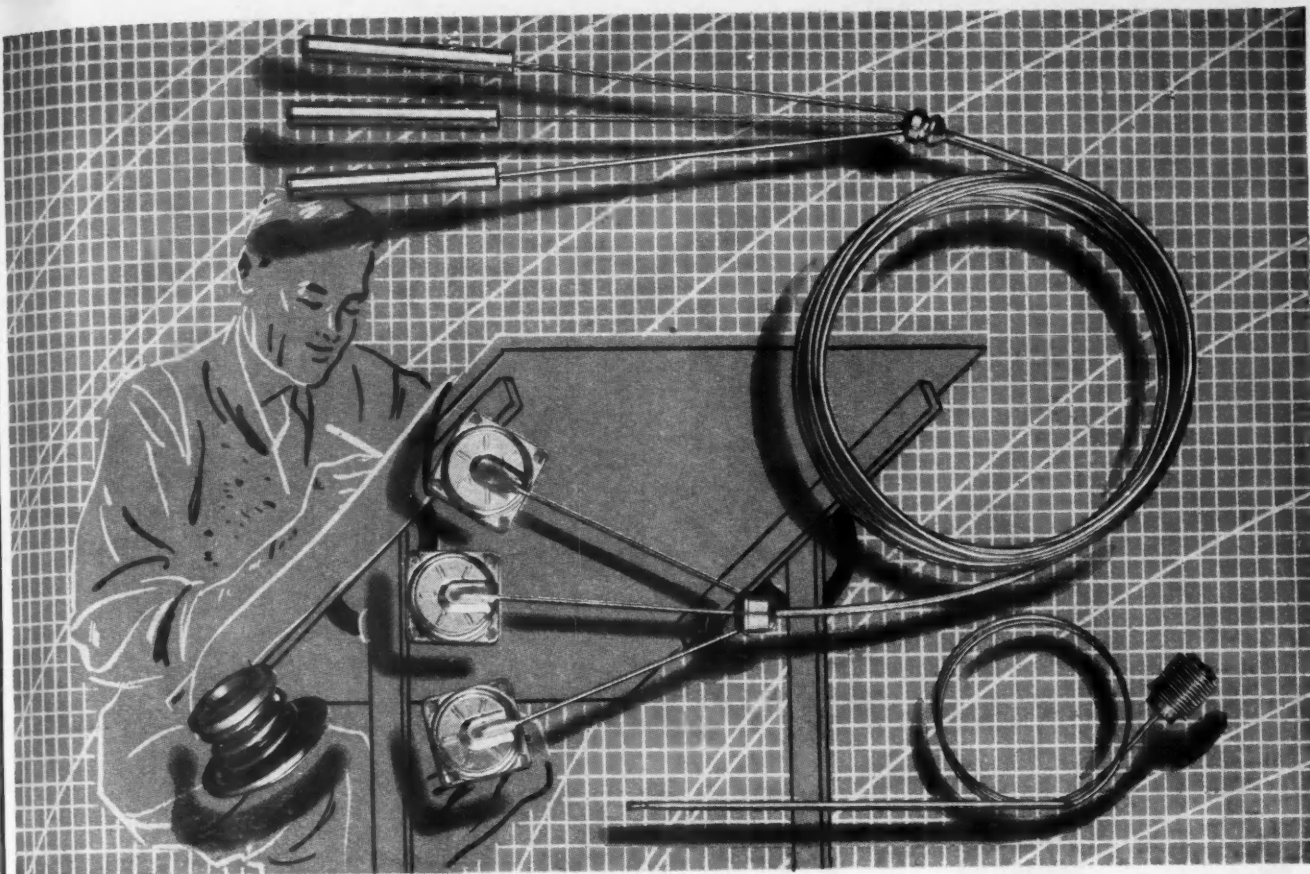
Automotive Industries,
Chestnut & 56th Sts., Philadelphia 39, Pa.

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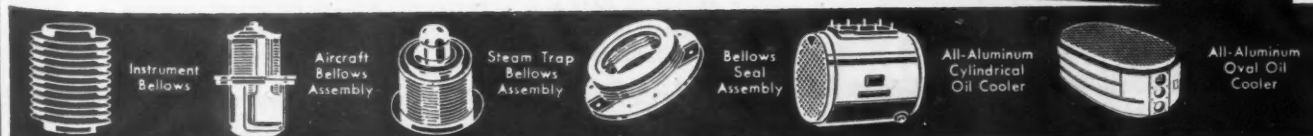
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French Try Comeback

(Continued from page 30)

its rear end. Chain drive is used for the camshaft. Four speeds plus an overdrive are provided with hydraulic shift. The radiator is vertical in front, with the water pipes carried through the box-section side rails. The spare wheel, battery and gas tank are mounted in front, with space under the hood for baggage, and additional baggage space just ahead of the rear engine. The front wheels are fully independent

with the upper and lower arms and utilizing rubber in shear under a system worked out in conjunction with the Pirelli Co. The rear wheels are semi-independent, also with rubber suspension. The design automatically places all the passenger load within the wheelbase. Weight distribution is 45 per cent on the front and 55 per cent on the rear wheels, this being practically invariable whatever the passen-

ger load. A speed of 100 miles is claimed for the six-passenger sedan. The body is welded to the chassis, all types being full width without running boards. The steering wheel layout is distinctive, utilizing a single spoke set below the center line when in the straight ahead position, with a big diameter clock set in the center of the wheel. Below this, to left and right respectively, are the turn indicator lever and the gear shift lever. On the instrument panel, seen through the steering wheel, is a quadrant indicating engine rpm and road speed. Position is such that the revolution counter and speedometer seem to be built into the steering wheel.

The frame of the new Caproni obviously came from the same drawing board as that of the Isotta Fraschini. Here the similarity between the two models ends, for the Caproni has a flat four engine of only 67 cu in. displacement, with front-wheel drive. The design is the work of Engineer Fessia. Wheelbase is 100 in., tread 48 in. and overall length 173 in. Complete chassis weight is 1256 lb, while the weight of the four-passenger sedan is 1850 lb. Power-weight ratio, empty, is 46 lb per hp.

The Caproni engine has four cylinders with a bore of 2.83 in. and a stroke of 2.675 in. Light alloy is used for the cylinder castings as well as for the heads, wet liners of 0.138 in. thickness being inserted, and steel valve seats being set in the head. The flat four provides a very low center of gravity, gives a low hood and places the whole of the radiator above the level of the engine. Water circulation is by thermosyphon, the fan being driven by belt from a pulley on the transmission. The generator is driven off the same shaft as the fan. The order of mounting is a single-plate dry clutch, the four-speed transmission and the differential. From the clutch the drive is taken to the constant mesh pinions at the rear of the transmission by a thin shaft having the function of a torsion bar, with a movement of eight deg, thus taking up shocks between the engine and the transmission. This cushion drive is carried inside the hollow primary shaft, and is mounted on needle bearings. Power is thus transmitted through the clutch and the torsion bar to the pinions and back to the four-speed transmission, with helical gears and direct drive on all but first and reverse. The final drive is by hypoid gears through half shafts and universals with needle bearings.

All four wheels of the Caproni are independently sprung, with upper and lower arms and a coil spring carried in an oil-tight casing mounted on the frame members at the inner end of the arms. The springs alone assure suspension, the oil in the casing being merely a lubricant, but in addition there is a hydraulic shock absorber

(Turn to page 64, please)

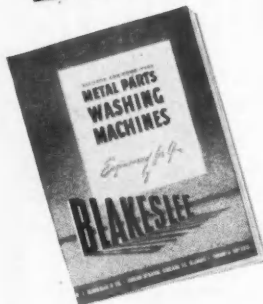


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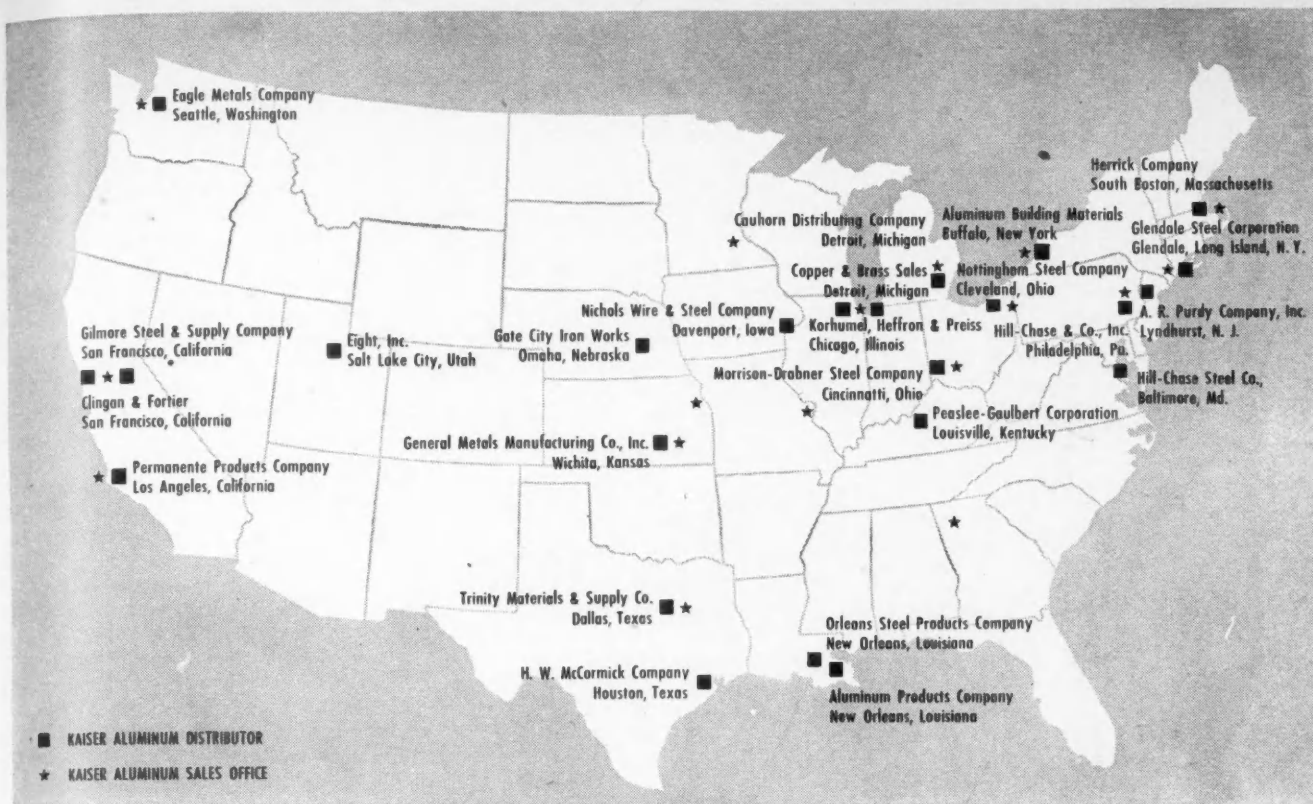
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French Try Comeback

(Continued from page 62)

inside the cylinder. The pair of cylinders for either front or rear are joined by an aluminum bridge piece which, at the front, is used to carry the screw and nut steering gear. Brakes are Lockheed operated, with 11 in. light alloy drums having steel liners. As in the case of the Isotta Fraschini, the whole of the passenger load is within the wheelbase. The rear narrowed

portion of the chassis, separated from the passenger compartment by the bridge piece supporting the suspension cylinders, is the baggage compartment. It was stated that the Caproni will be in production by the middle of next year.

Fiat seems to have made little mechanical change other than the addition of a sports sedan on the 67 cu in. model. Keeping the bore and stroke of the original model, a special crankshaft with copper-lead bearings is fitted. The valves have stellite seats and stems, water circulation around the valves has been improved, and on oil radiator is provided. The result is an

engine developing 50 hp at 5200 rpm with 70 octane gas. With the streamlined sedan body, and a total weight of 1800 lb, a road speed of 93 mph is claimed.

Maserati showed a racing and a sports model, both of 91 cu in. capacity with six unsupercharged cylinders. A tubular frame is used, with independent coil-spring suspension front and rear.

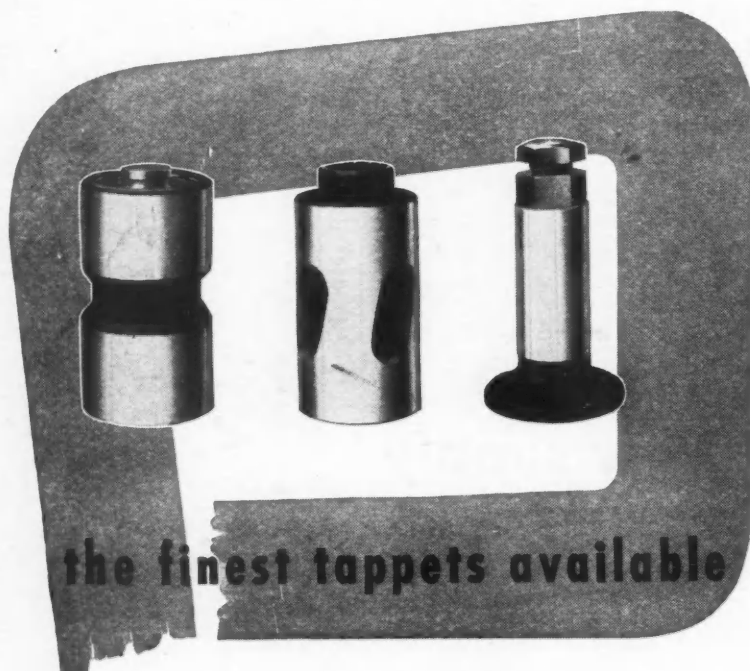
Alfa Romeo's line was a non-supercharged six cylinder of 150 cu in. capacity presented in a sports and touring version. Both have double overhead camshafts, with triple carburetors for the sports type. Lancia has made little change and is specializing on the Aprilia model with a four-cylinder engine of 91 cu in.

An outstanding feature of the Italian models is the attention which has been given to styling, which is so pronounced that there is quite an Italian school differing appreciably from that of France, England or the United States. The general line is that of an army tank, with the hood merging into the fenders. Naturally, running boards have gone, the body being carried out to the full width of the hub caps. The headlights in practically all cases are recessed in fenders. The radiator grille forms the firm's motif on a reduced scale, frequently with horizontal slots to left and right of it, and a bumper incircling the lower edge of the fenders, with a minimum of chrome plating. In the case of the Fiat sports model the radiator grille consists merely of a series of vertical bars, flanked to left and right, low down, by four horizontal bars. The headlights are recessed in the fenders. Several of the Italian sports models have a Plexiglas roof which, by deformation, can be lifted along the leading edge to allow a current of air to enter the body. Climatic conditions make it necessary to fit a roof curtain in addition.

French lines are more ornate than those of the Italians, the fenders in all cases being treated separately to form at the front a channel into which the headlights are fitted. In many cases the lamps are recessed in this channel, but it is very rarely that the French mount them in the fenders themselves. It is obvious that with the tendency towards horizontal engines, either front or rear, body possibilities are considerably modified and reduced height is obtainable, with increased visibility.

Czechoslovakia's main contribution to the show was the Tatra eight-cylinder air-cooled rear-engine model which has a central backbone frame and independent suspension all round. This was supplemented this year by a flat four of 122 cu in. (3.34 by 3.38 in. bore and stroke) with a four-speed transmission and torsion bar suspension at the rear.

Commercial vehicles occupied not
(Turn to page 67, please)



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French Try Comeback

(Continued from page 64)

only a portion of the main hall but the whole of a temporary building erected a short distance away. Here the international element was less pronounced. The French tendency is towards Diesel fuel injection engines for useful loads of three tons upwards. There is an increasing use of light alloys for body construction for both buses and trucks. Coaches show considerable activity with unit construction of chassis and body both in light alloys and in steel, and there were several examples of rear engine mounting for coach service.

De Dion presented a new two-stroke double-piston supercharged Diesel with two crankshafts. With a cylinder bore of 2.56 in., the combined strokes of the two pistons of this six-cylinder unit are 5.51 in., and engine speed was stated to be 3000 rpm with an output of 100 hp. The Roots blower is mounted at the rear and driven off the upper crankshaft, the fan drive being taken off the opposite end. Forming a unit with the engine is the clutch and seven-speed and reverse transmission. The seventh gear is an overdrive and, when engaged automatically, cuts down the engine speed, through the injection system, to 2300 rpm. The engine has been primarily designed for coach service, and this seventh overdrive is for use on straight, fast, level roads. Another feature is an oil circulation by pump through the transmission.

On a Lancia six-cylinder 8½-ton Diesel fuel-injection truck, a double transmission, giving eight forward speeds and two reverse, is fitted. This chassis also had a slow-down compressed air brake, mounted on the drive shaft, just ahead of the friction emergency brake. The object of this was to reduce speed on long grades, and thus relieve the ordinary brakes. Westinghouse introduced a brake on the same principle a year ago.

Unusual in design was the Macchi three-wheeler light truck handling a useful load of 1½ tons, or 2½ tons with trailer. The power plant is an air-cooled flat twin of 45 cu in. capacity, with a positively driven centrifugal blower directing air on the heads and down the cylinder barrels. In a unit with the engine is the clutch and four-speed transmission, all the housings being in aluminum alloy. The power plant is suspended below a stiff tube connecting the motorcycle-type steering forks to the rear chassis which is conventional-type construction with a conventional rear axle and semi-elliptic springs. Connection between the four-speed transmission is by open propeller shaft of conventional design. Despite the unusual front end construction, conventional wheel steering

and gear shift are used. With a deadweight of 1830 lb, it is claimed that a useful load of 3300 lb could be handled without the two-wheel trailer. This latter, adding another 750 lb to the deadweight increased the useful load by 2200 lb.

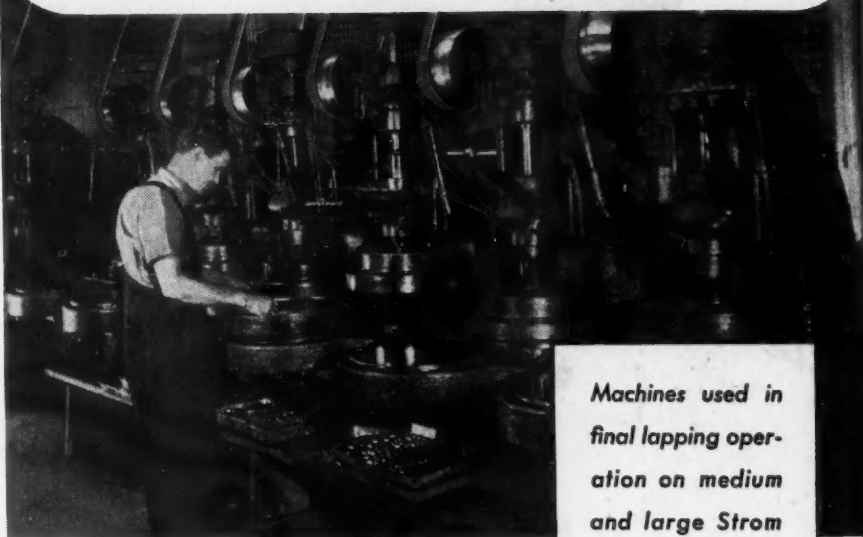
American firms taking part in the Paris Salon were Ford who showed the French-built models together with a 10 hp car from the English factory, De Soto, Kaiser-Frazer, Cadillac, Lincoln, Buick, Oldsmobile, Packard, Nash, Willys and, in the truck section—Fargo, International, Marmon-Herrington, and Detroit Automotive Products Co.

Monocoupe Moves to Melbourne, Florida

The Monocoupe Airplane & Engine Corp., Orlando, Fla., has been purchased by a group of West Virginia investors, and the plant will be moved to Melbourne, Fla. It is expected that production will start soon on the 1948 model, a two-place, high wing, fabric covered model, basically the same as the prewar plane, powered by an engine developing 100 hp.


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Business in Brief

Written by the Guaranty Trust Co., New York, Exclusively for AUTOMOTIVE INDUSTRIES

Further advances in general business activity are indicated. The *New York Times* index for the week ended Nov. 1, stands at 147.3, as against 145.2 for the preceding week and 140.1 a year ago.

Sales of department stores during the week ended Nov. 8, as reported by the Federal Reserve Board, equaled 347 per cent of the 1935-39 average, as compared with 313 in the week before. Sales were 10 per cent above the corresponding distribution a year earlier, as against a preceding similar excess of 13 per cent. The total in 1947 so far reported is eight per cent greater than the comparable sum in 1946.

Electric power production increased slightly in the week ended Nov. 8. The output was 8.0 per cent above the corresponding amount in 1946, as compared with a like advance of 8.2 per cent shown for the preceding week.

Railway freight loadings during the same period totaled 910,160 cars, 3.3 per cent less than the figure for the week before and 0.3 per cent below the corresponding number recorded last year.

Crude oil production in the week ended Nov. 8 averaged 5,239,550 barrels daily, or 34,700 barrels less than the preceding average but 460,000 barrels above the comparable output in 1946.

Production of bituminous coal and lignite during the week ended Nov. 8 is estimated at 12,830,000 net tons, 20,000 less than the output in the week before. The total production in 1947 so far reported is 12.5 per cent above the corresponding quantity in 1946.

Civil engineering construction volume reported for the week ended Nov. 13, according to *Engineering News-Record*, is \$159,327,000, or 64 per cent more than the preceding weekly figure and 42 per cent above the comparable sum in 1946. The total recorded for 46 weeks of this year is five per cent more than the corresponding amount in 1946. Private construction is two per cent below that a year ago, but public construction has increased by 16 per cent.

The wholesale price index of the Bureau of Labor Statistics for the week ended Nov. 1 is 157.4 per cent of the 1926 average, as compared with 158.0 for the preceding week and 134.8 a year ago.

Member bank reserve balances decreased \$249 million during the week ended Nov. 12. Underlying changes thus reflected include an increase of \$49 million in Reserve bank credit and a rise of \$298 million in Treasury deposits with Federal Reserve banks, accompanied by an advance of \$74 million in money in circulation.

Total loans and investments of reporting member banks decreased \$124 million during the week ended Nov. 5. An increased of \$154 million in commercial, industrial and agricultural loans was recorded. The sum of these business loans, \$13,971 millions, shows a net increase of \$3059 million in 12 months.

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Push-Button Weapons

(Continued from page 43)

warhead, of 6750 lb) and will undoubtedly travel at supersonic speeds.

The probable costs of development of a 1500 to 5000 mile missile up to the state of being suitable for combat use would be \$200-\$300 million. Present appropriations, however, make no adequate provisions for such a program. Under optimum accelerated conditions in peacetime, 10-15 years would be required for such a development. The Germans spent 11 years on the V-2, of which the last six years were intensive.

The Problems of Aircraft Development

By Glenn L. Martin, President
The Glenn L. Martin Co.

THE problem of applying basic research data culled from many existing laboratories, both government and privately owned, involves the establishment and maintenance of expensive facilities to develop and test different units of the experimental airplane being developed from the basic element data. These facilities either must be procured individually by each aircraft manufacturer or must be available for his use within a reasonable

distance and at the proper time. Obviously the facilities needed, in first cost and operating requirements, are far beyond the individual manufacturer's financial reach under existing Government procurement policies and the present condition of the commercial airplane market. Present Government procurement policies do not permit the inclusion in contract costs of such overhead items as the cost of building and operating research facilities.

For high altitude and high speed aircraft, there should be available at least three types of wind tunnels: low speed tunnels capable of developing air speeds up to about 300 mph to be used for establishing the basic configuration of the airplane without expending the large amount of money and time required for building the complex models needed for tunnels of higher speeds; medium speed tunnels capable of developing air speeds up to about 750 mph to be used for obtaining the final quantitative aerodynamic data required before actual construction of the full-size airplane begins; and supersonic tunnels large enough to accommodate small scale models and to be used for the investigation of flight characteristics of airplanes and guided missiles at higher speeds.

In addition to the above, there is a need for tunnels to simulate icing conditions on various components and to investigate duct flows in the various air systems, such as cabin supercharging, ventilating, wing anti-icing, power plant induction and supercharging systems.

Static and dynamic structural test laboratories, large enough to test a full sized component, are needed. This type of laboratory should also include facilities for the investigation of the elastic and vibration characteristics of the structure and for the development of equipment and procedures for full scale measurement of stresses in flight and landing operations. Also, there should be available completely equipped general laboratories adequately staffed and containing facilities for high altitude, low temperature testing, electronic development, hydraulic, electrical, and fuel system installation performance, as well as facilities for the firing of fixed and movable guns.

Production Status, Serviceability and Development of Turbine Engines

By R. M. Hazen
Director of Engineering
Allison Division, General Motors Corp.

SINCE the turbo-jet is the simplest, lowest cost, easiest to install, smooth and lightest type of power plant for aircraft, it is inevitable that it will be selected for use on any military or commercial airplane where the performance and economical operation required can be achieved by this type of power. However, its application is severely limited by poor takeoff and climb characteristics.

(Turn to page 74, please)



His plodding—time-consuming—methods would be as hopelessly outdated as old fashioned ways of cleaning metals.

BUT...

Duridine*

CHEMICALS
ACP
PROCESSES

RUST PROOFING AND PAINT BONDING

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Duridine *
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Lithoform *
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RUST REMOVING AND PREVENTING

Deoxidine *
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used in power spray washers of mild steel, provides modern metal cleaning and phosphate-coating that is rapid—effective—economical. It removes oil, grease and other foreign surface matter—phosphatizes—changes the surface to a non-conductive phosphate film of uniform crystalline consistency. "DURIDINE" establishes a lasting adhesive bond for paint finishes. In addition, this bond prevents rust encroachment when painted surfaces are accidentally scratched or dented.

For proper cleaning and effective phosphatizing of metal surfaces—specify "DURIDINE".

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AMERICAN CHEMICAL PAINT CO.
AMBLER **ACP** PENNA.

"We can set 'em up tight without 'skids' ...make a stronger assembly"

say the makers of *American*
KITCHENS
STYLED IN STEEL

High-spots from full report of independent investigator of James O. Peck Co., studying assembly savings made in leading plants with Phillips Screws.



"HINGES are the weak spots in many kitchen cabinets," explained the purchasing agent for American Central Div.-Avco Mfg. Corp., "But on ours, the hinge is a point of strength, mainly because we use Phillips Screws.

"**Tighter Set-up** is easy with Phillips Recessed Head Screws. But it's difficult to get the same firm 'bite' in sheet metal with slotted screws because the driver doesn't have the same purchase in the slotted screw as it has in the Phillips Recess. And slotted heads would burr . . . make dangerously sharp edges to cut hands and arms, snag clothing.

"**Protects Panels from Driver Gouges.** We don't have to worry about driver slippage with Phillips Screws. No patching or repainting to interrupt our assembly.

"**Quicker Location of Screw** steps up assembly. The instant seating of the driver in the Phillips Recess gets the screw going faster, — and straight, sure driving without worry about slips speeds the whole operation".

Your Assembly Operations Can Benefit by ideas in this report on the American Central Div.-Avco Mfg. Corp. methods, and other reports of assembly studies . . . covering metal, wood, and plastic products. Use coupon.

◀ This is an American Kitchen Cabinet door, getting a hinge that won't loosen in years of opening and closing . . . thanks to the ease with which Phillips Screws can be set up tight without burring, and without driver slips that would gouge the highly finished panel.



PHILLIPS Recessed Head SCREWS

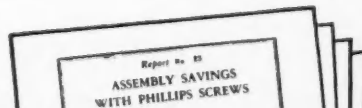
Wood Screws • Machine Screws • Self-tapping Screws • Stove Bolts

American Screw Co.
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American Hdwe. Corp.
Eco Tool & Screw Corp.
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24 SOURCES

National Screw & Mfg. Co.
New England Screw Co.
Parker-Kalon Corporation
Pawtucket Screw Co.

Pheol Manufacturing Co.
Reading Screw Co.
Russell Burdall & Ward
Bolt & Nut Co.
Scovill Manufacturing Co.
Shakeproof Inc.
The Southington Hardware Mfg. Co.
The Steel Company of Canada, Ltd.
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Phillips Screw Mfrs., c/o Horton-Noyes
1800 Industrial Trust Bldg.,
Providence, R. I.

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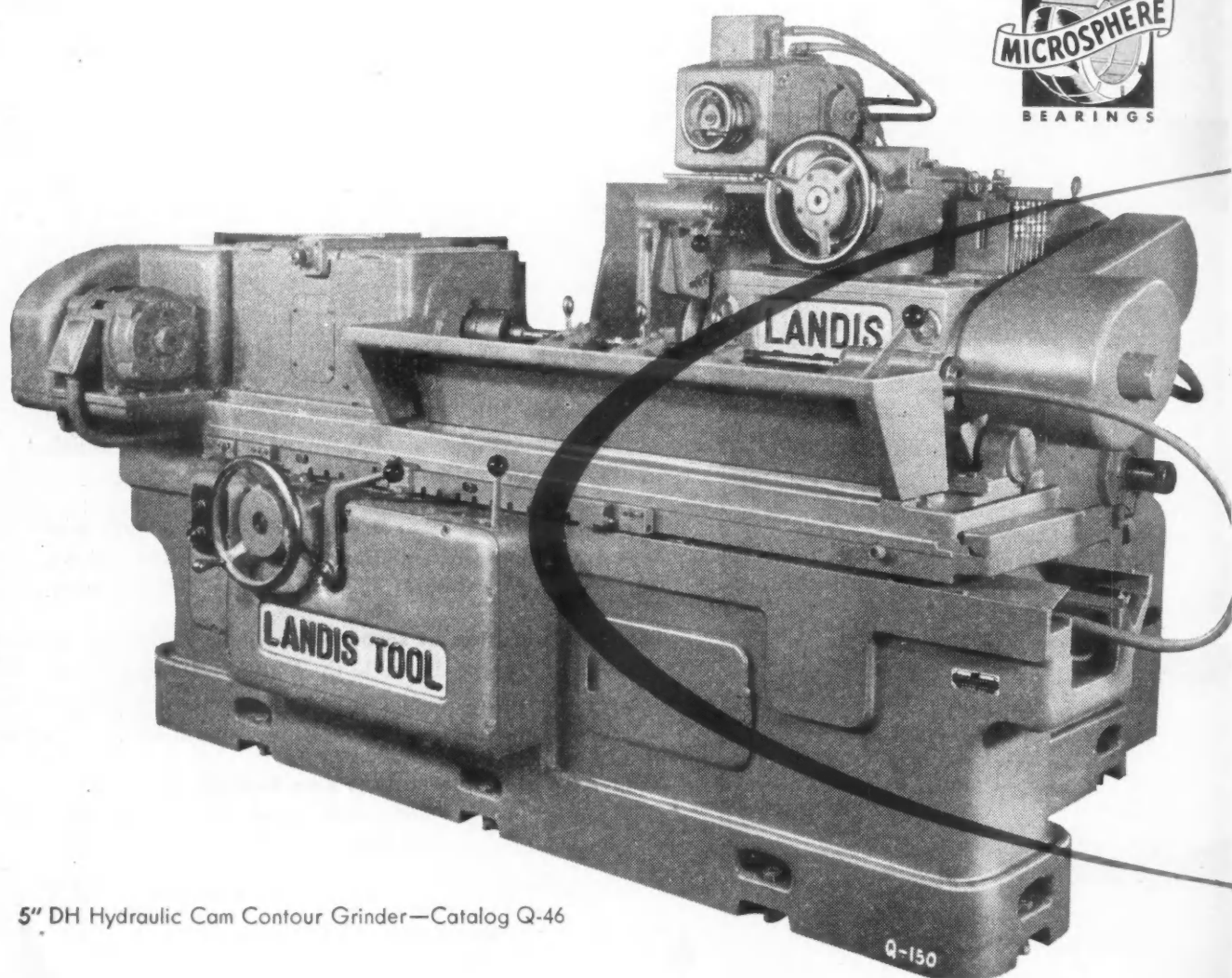


AA-24

hydraulic cam contour grinder

OPERATION 80% AUTOMATIC

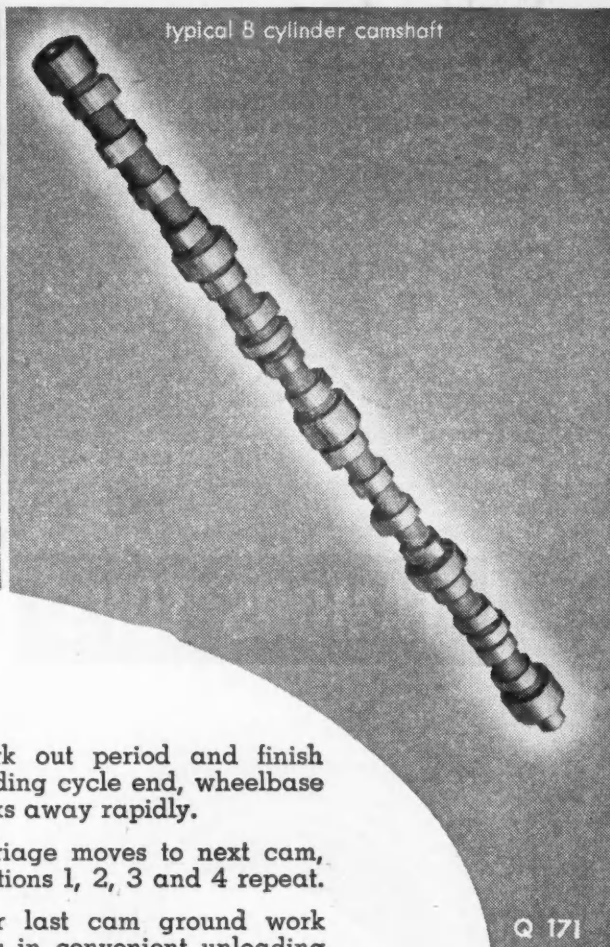
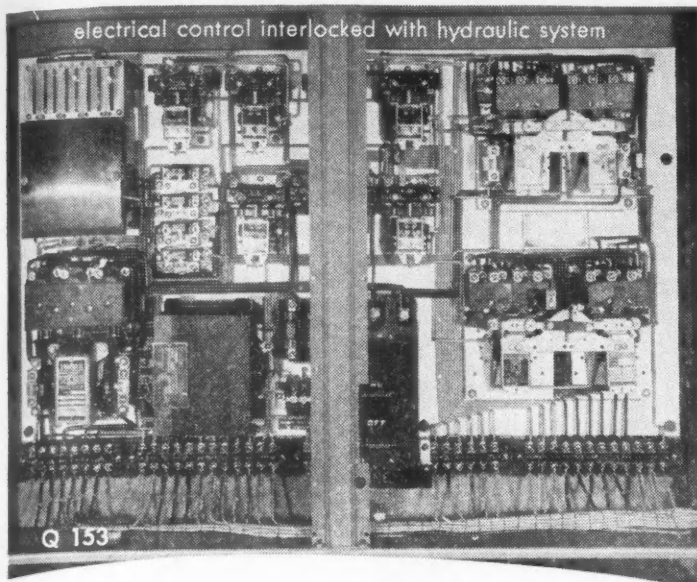
gives high production — close tolerances



5" DH Hydraulic Cam Contour Grinder—Catalog Q-46

LANDIS TOOL
Precision Grinders

72



grinding cycle operation 80% automatic

manual operation

1. Operator loads machine.
2. Operator moves control lever to start position.

automatic cycle

1. Carriage moves to grinding position on first cam.
2. Work rotation increases to rough grinding speed, wheelbase feeds in rapidly, wheel spindle reciprocation and grinding feed start.
3. Rough grinding ends, work rotation slows to finish grinding speed.

4. Spark out period and finish grinding cycle end, wheelbase backs away rapidly.

5. Carriage moves to next cam, functions 1, 2, 3 and 4 repeat.

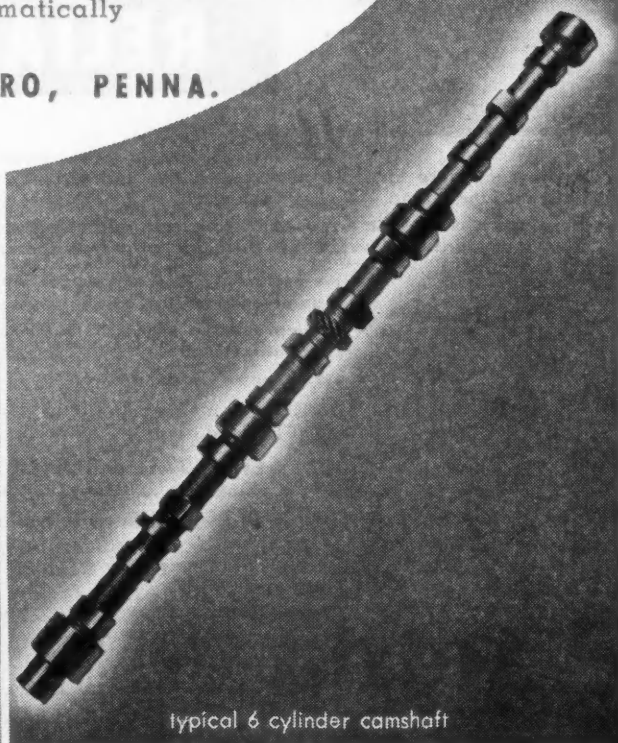
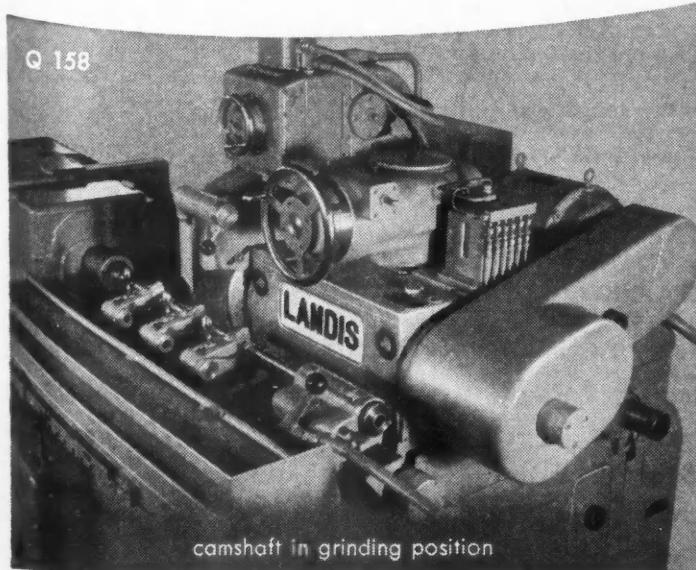
6. After last cam ground work stops in convenient unloading position.

manual operation

3. Operator unloads and reloads machine. While removing finished camshaft and reloading, grinding wheel is dressed automatically

Q 170

LANDIS TOOL COMPANY, WAYNESBORO, PENNA.



Turbine Engine

(Continued from page 70)

acteristics and high fuel consumption except at very high speeds and altitudes.

There has now been sufficient production and flight operation on one type of turbo-jet engine to justify the advantages claimed for turbo-jets and, in addition, to show that it is susceptible to a rapid rate of endurance and performance improvement. Two turbo-jet engines are currently in considerable production in this country. A third smaller turbo-jet is in the preproduc-

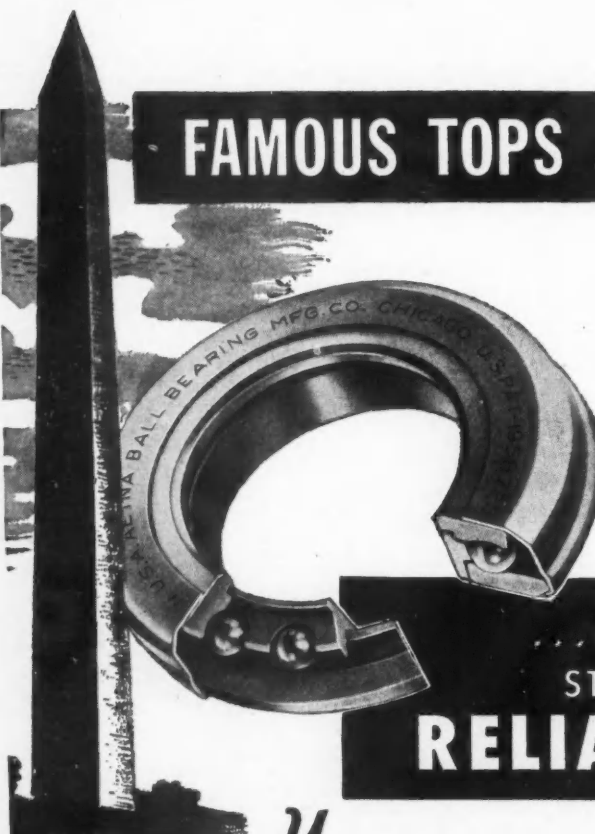
tion stage, and two additional types should be ready in the next year. Unfortunately, four out of five of these types are roughly in the same size or power class. Unless some of these types can be developed at an unusual rate to higher outputs it would appear that, with the need for a variety of sizes in turbo-jet engines to cover airplane requirements properly, more emphasis should be placed on development of a range of sizes than on having competitive engines of somewhat similar size. Other sizes are under development but are limited by available development funds. However, it is possible on a given type of turbo-jet to de-

velop improved performance more rapidly than has been accustomed on reciprocating engines.

Durability improvement on one type turbo-jet engine which has been in production over two years has steadily increased until the model or endurance test requirements are now on the same 150 hour basis as reciprocating aircraft engines. Likewise on service overhaul, the period for engine removal has steadily increased and, for a given model engine, appears to average twice the endurance test requirement as regards time allowed. In considering durability, it should be noted that American experience is with single engine fighters, and that overhaul time is increased slowly and cautiously on this type airplane as compared to multi-engine machines or bomber or transport aircraft applications. For example, reciprocating engines in single engine fighters usually average 300 to 400 hour overhaul periods whereas the same engines in bombers or transports may do 750 to 1000 hours between overhauls due to the difference in usage and the multi-engine safety factor.

Turbo-jets in their present state of development are susceptible to rather rapid improvement. On a model just going into production the take-off thrust per pound of engine weight is 64 per cent higher now than two years ago for a jet engine of the same external dimensions. It is estimated that this rapid rate of progress can be continued for some time before the law of diminishing returns sets in.

Ducted fan jets and turbo-prop engines are more complex, take longer, and cost more to develop than turbo-jets. There is a considerable weight of opinion which feels that ducted fans can be neglected, but there are others who feel this type has a definite field of usefulness between jets and turbo-props.



FAMOUS TOPS

...they both
STAND FOR
RELIABILITY

YOU always want them, demand them, in equipment as in men: those tough, enduring qualities that produce utter reliability. They're built into the Aetna "T" Type Bearing.

Here, truly, is a product proved by time, and in those vital spots of hardest service. No wonder that most automotive manufacturers look upon it as a "Must" for clutch release duty—

- the exclusive "T" type retainer maintains precise alignment—no eccentric thrust, no chatter, no excessive wear
- oil impregnated bronze retainer—smooth, silent bronze-to-steel contact
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It's a trusty sign of dependability in any vehicle—the famous Aetna "T" Type Bearing. Let's talk about it for your product.


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ROLLER BEARINGS
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GROUND WASHERS



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CALENDAR

Conventions and Meetings

Amer. Soc. of Mechanical Engineers, Annual Mtg., Atlantic City.....	Dec. 1-5
52nd Congress of Amer. Industry, New York	Dec. 3-5
International Aviation Mtg., El Paso, Texas	Dec. 4-7
Automotive Service Industries Show, Chicago	Dec. 8-13
Natl. Motor Boat Show, New York City Jan. 9-17	
Soc. of Automotive Engineers Annual Mtg., Detroit	Jan. 12-16
Natl. Materials Handling Exposition, Cleveland	Jan. 12-16
Natl. Auto Dealers Assoc. Exhibition, Chicago	Jan. 25-29
Institute of the Aeronautical Sciences— Annual Mtg., New York.....	Jan. 26-29
International Sports, Travel and Boat Show, Chicago	Feb. 27-Mar. 7
Tool Engineers Industrial Exposition, Cleveland	Mar. 15-19
Chicago Production Show, Chicago Mar. 22-34	
Natl. Assoc. of Corrosion Engineers Mtg., St. Louis	Apr. 5-8
32nd International 500-Mile Race, Indianapolis	May 21



New Stinson Flying Station Wagon

It's here! Stepped up in range, speed, payload! The great new Stinson for '48

New? Yes! But more important, the new 1948 Stinsons—of *proved* design—are America's most useful, most practical, personal planes.

For a Stinson carries four people comfortably and economically—is equally useful for family or business travel. Its roomy interiors—newly styled by the famous designer Henry Dreyfuss—provide plenty of luggage space.

Long time fliers prefer Stinson dependability and safety. Beginners are delighted with Stinson flying ease and simplified control. You can learn to fly solo in ten hours or less.

Visit your Stinson dealer for a look at the Stinson Voyager or Flying Station Wagon. See for yourself why Stinson leads in popularity in the 4-place field.

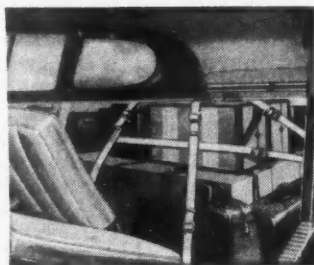
For literature write Stinson Division, Dept. L, Consolidated Vultee Aircraft Corp., Wayne, Michigan.

For 22 years, builder of America's most useful personal planes

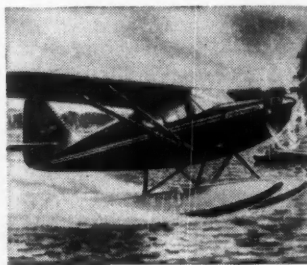
Stinson



Finer "Fly-anywhere" performance
Quick take-offs. Slow landings. Cruises at 130 m.p.h., at 5,000 ft. Range, 554 miles.



New, higher pay-load capacity
640 cargo and baggage lbs. plus pilot—or four people with 100 cargo-lbs.



New, greater all-purpose utility
28% greater range, 14% more useful load. Can be equipped with floats or skis.



New ease of control
The spin-resistant Stinson is so easy to fly that beginners solo in ten hours or less.

Stinson has new flight instruction plan for business and professional men interested in saving time and money—Write W. H. Klenke, Jr., General Sales Manager, Stinson, Wayne, Michigan.

Continued from page 39)

Straws in the Wind

By Raymond H. Dietrich

Some present day cars appear as though they are built and assembled in sections, thereby disturbing the continuity of line. This must be corrected because grace, balance and power should be suggested from bumper to bumper. Special thought must be given to the design of the front-end as this is the point where distinction can be gained and originality shown, thus establishing a trade mark for the manufacturer. There will be no indi-

vidual fender design because the blending of these surfaces becomes the frontal face.

Greater windshield angle is necessary so that points of obstruction are moved from the line of vision. It is predicted that the curved glass one-piece windshield is forthcoming in these new designs. However, glass manufacturers cannot be expected to introduce them; they are waiting for the designer to create the demand, and are ready to help work out the problems and details which will become apparent. From the driver's point of view, one of the objections to the present windshield is the

amount of reflection suffered from the heavy chrome decorations unnecessarily displayed on the instrument panels. These reflections exist night and day.

From the windshield back, the roof lines will be a matter of individual taste. The designer who streamlines will probably be as right as the one who designs for the tonneau effect. Window openings will play an important part in expressing length and lowness, and entrance clearances must be closely watched because the passengers dislike being jackknifed.

The riding comfort of passengers is of prime importance, and the chassis engineer has contributed a great deal to it. Now, inasmuch as function and need determine the seating plans, these plans should be worked out by the body designer before outside lines are established. There are requirements for proper seating which have been definitely established over a period of years consisting of leg room, head room, height and slope of cushion, and angle of the back. In order to work out a comfortable riding cushion and relieve tension from the spine, the designer must be familiar with the spring action of the chassis.

The chassis and body engineers have always tried to prevent a forward motion of the passenger when a fast stop is necessary, and bottoming of the cushion during a rough ride. With the present coil spring construction it has been possible to correct only some of these difficulties. There has been extensive experimental work done on developing a rubber air cushion. This type of construction eliminates all coil springs. The ride is controlled by a specified amount of air. This construction has three distinct advantages: the cushion and back weigh less; the supporting construction would be inexpensive to manufacture because of its simplicity; and it is impossible to bottom the cushion or get any forward motion when going into a sudden stop. This would be a real advantage in creating the future design when over-all height will be considered.

All indications point to the unit construction of body and chassis. To the designer this means a greater freedom.

Problems Facing Modern Body Designers

By E. D. Scott
Ford Motor Co.

Modern design must have the full help of the research engineers in order to take every advantage of weight reduction and the proper distribution of stress. There are some few scattered places where units made of steel can be changed to aluminum. These are usually baffles or spacer panels with no value as to strength function. The aluminum companies have been working with certain automobile companies and have actually made all-aluminum bodies or parts of the same, such as
(Turn to page 78, please)

Tuthill Springs

put the
"float" →
into this

Floating Comfort seat
FOR FARM TRACTORS



THE story was an old one: wrenched and jolted backs. Tractor drivers long complained of aching muscles and nervous fatigue after a day in the field. Small wonder. Tractors are built for performance, not luxury; farmland rocks and furrows aren't exactly velvety highways, either.

Farm Appliance Corporation decided to do something about it. They took their problem to the Tuthill Spring people. The two worked out the final solution pictured above. It is a combination of Tuthill leaf and coil springs.

It takes up all original shock, damps out the recoil. Enthusiastic operators have dubbed it the "Floating Comfort" seat support.

Tuthill's long history has been one of smoothing out jolts and aches for America. Tuthill's line of automotive and implement springs is a complete one. Laboratory control of quality guarantees you tough, flawless springs. Consult the Tuthill Engineering Department on your own springing problems. Write today.

Spring design is a specialist's business.

Write today.

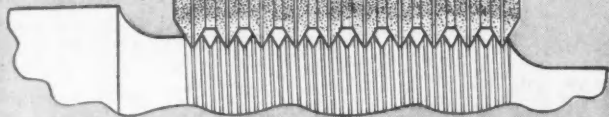


**TUTHILL
SPRING CO.**

760 W. Polk St.
CHICAGO 7, ILL.

Quality Leaf Springs for Sixty-Seven Years

Enlarged view
of 10 ribbed
wheel and thread.
Work makes ap-
proximately 2½
revolutions.

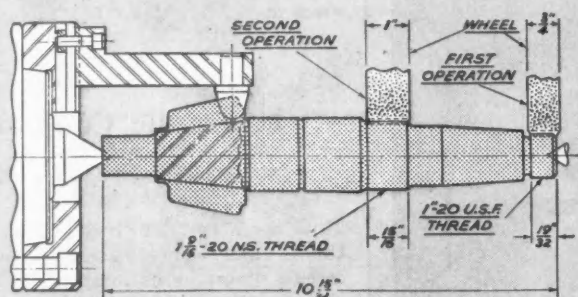


HERE'S *Production* THREAD GRINDING . . .

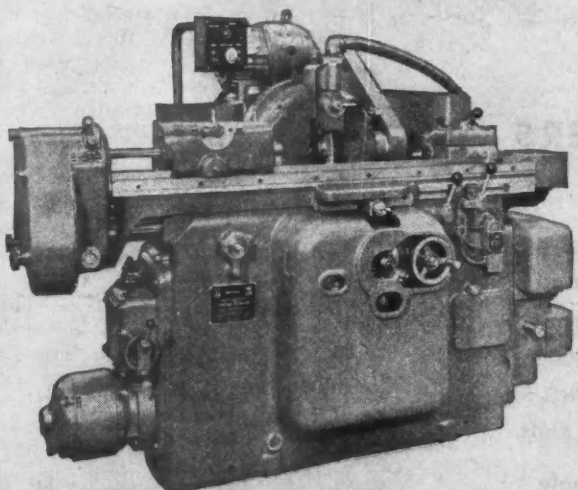
Ground from the Solid

in *15 seconds*

1"-20 N.S. THREAD, GROUND FROM THE SOLID



ON AXLE DRIVE PINIONS



JONES & LAMSON AUTOMATIC THREAD GRINDERS

"PRODUCES NEAR PERFECT THREAD"

"EXPENSIVE HAND DIE OPERATIONS
ELIMINATED"

"NO MARRED THREADS ON THE
ASSEMBLY LINE"

"WHEEL COST PER PIECE LESS THAN
THREAD HOB AND CHASER COST"

The Timken Detroit Axle Company, prominent manufacturer of heavy truck axles, has this to say about a Jones & Lamson Automatic Multi-Ribbed Thread Grinder installed to grind the threads on axle drive pinions.

"The threads are machined as a last operation following heat treat and grinding of all bearing diameters and prior to lapping. The machine produces a near perfect thread and eliminates all expensive hand die operations along the line and overcomes marred thread on the assembly line".

"... the grinding of threads also reduces direct labor costs and indirect cost of cutting tools and equipment".

Jones & Lamson Automatic Multi-Ribbed Thread Grinders offer remarkable opportunities for economy with better quality in the mass production of threaded parts. Ask for one of our engineers to tell you more about multi-ribbed production thread grinding.



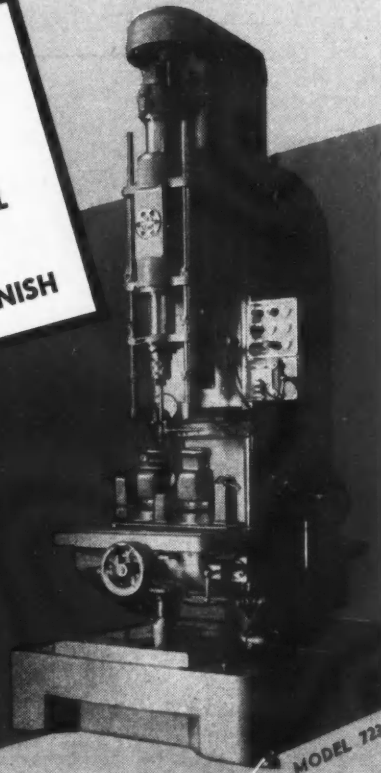
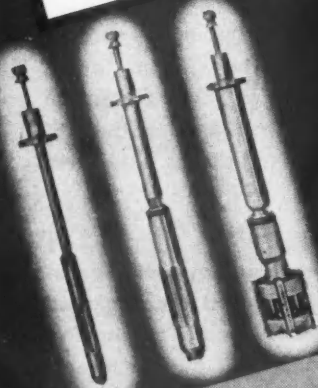
JONES & LAMSON MACHINE COMPANY, Springfield, Vermont, U. S. A.

Manufacturer of *Automatic Thread Grinders* and Universal Turret Lathes •
Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical
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4 COMBINED RESULTS
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in many different installations have cut total processing by one or two operations—have reduced the over-all amount of waste stock removal—have generated uniform final size AUTOMATICALLY within 0.0001 to 0.0003-inch—eliminated selective fits in some parts—reduced inspections to one or two spot checks per shift.

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(Continued from page 76)

side doors and luggage doors, hoods, aprons, etc. In most cases the aluminum thickness has been increased about 50 per cent over steel.

Aluminum is definitely becoming a part of the body industry. Manufacturing problems face the use of it more than engineering, such as handling of scrap where steel and aluminum are fabricated in the same department, or the welding problem of aluminum, as to the time cycle, and other shop problems such as metal finishing and painting. When these four big problems are solved we will have aluminum bodies. Extrusions and rolled sections of aluminum are replacing steel and can meet cost too, plus the reduction in weight, which makes them attractive. The designer of today's modern bodies must think of aluminum and use it to replace steel as a weight saving factor.

Hydraulic Coupling

(Continued from page 37)

unit's diameter. For hydraulic couplings this is fairly correct in sizes above 20 in. circuit diameter as long as the circuits are exactly similar. Below 20 in. in diameter the actual torque or horsepower transmitted falls much below the theoretical amount.

In order to establish this relationship the torque transmitted by a given size coupling at three per cent slip and five per cent slip at its normal running speed is corrected by the square relationship on speed and the fifth power relationship on diameter to the equivalent capacity of a 10 in. single circuit hydraulic coupling operating at 1000 rpm. A curve such as that shown in Fig. 1 is thus obtained. This curve shows that a 10 in. coupling of cast construction only carries 10 per cent as much torque as the 20 in. unit at the same slip when both are corrected to the same size and speed. An eight in. coupling on the same basis only carries about 46 per cent as much torque as it supposedly should. Couplings of sheet steel construction follow the same general trend although they have not been built in small enough sizes to have completed the curve.

Although the torque capacity when corrected to a common size for the smaller size units falls off seriously, the drag torque remains about constant; therefore the ratio or relationship between drag torque and torque capacity becomes steadily poorer as the size decreases. The drag torque factor is another one of those "yard sticks" for judging coupling performance. It is a dimensionless ratio between the torque transmitted at three per cent slip at a given speed and the torque absorbed at stall or drag torque at the same speed. In order to avoid testing

(Turn to page 82, please)

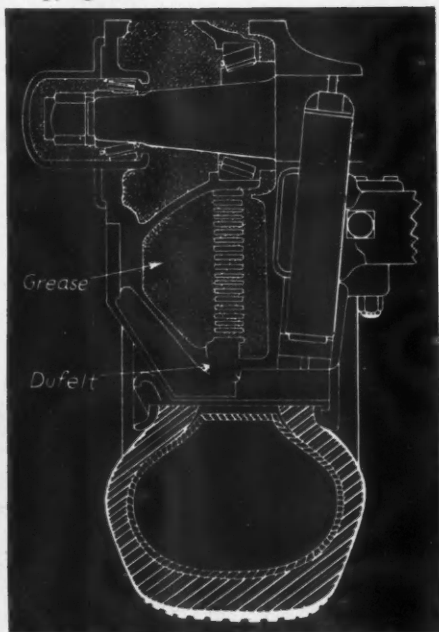
DUFELT*

Lubricant Seals

**Keep Oil IN,
Dirt OUT—
and last a lot
longer!**

DUFELT *

DUFELT is Felters Felt laminated with Neoprene. It may be made with any number of layers and any combination of consistencies of Felters Felt and Neoprene sandwiched together. DUFELT, a product of The Felters Company, is registered under U. S. Patent No. 2,003,934. The name "DUFELT" is copyrighted.



Drawing (above) illustrates unique use of DUFELT by Walter Motor Truck Company, Ridgewood, L. I., New York, in axle assemblies of their heavy duty units. This seal has proven superior to all others previously used. Temperatures range up to approximately 200 degrees F. A soda base lubricant is used. Large photo (upper right) shows actual installation of DUFELT seal in retainer before assembly.

Courtesy Walter Motor Truck Company



Felt, because of its tough resiliency, when coupled with Neoprene reduces the tendency of frictional heat from shaft contact to disintegrate the seal.

In addition, felt prevents the entrance of dust, dirt and grit.

The Neoprene coating provides a waterproof, oilproof, greaseproof dam — holds the lubrication where it's needed — as the Neoprene is always in a plane perpendicular to the lubricant flow.

When lubricated with oil, DUFELT is recommended for use under temperatures up to 250° F. for 10-day periods, and for continuous use at temperatures up to 200° F. DUFELT has a high resistance to chemicals and acids and will withstand mild alkaline solutions at moderate temperatures.

Get full details on DUFELT and for quick, easy, accurate ordering — be sure to ask for your free copy of the Felters Precision Cut Felt Parts Manual. You can have it by simply dropping us a card, so do it — now!

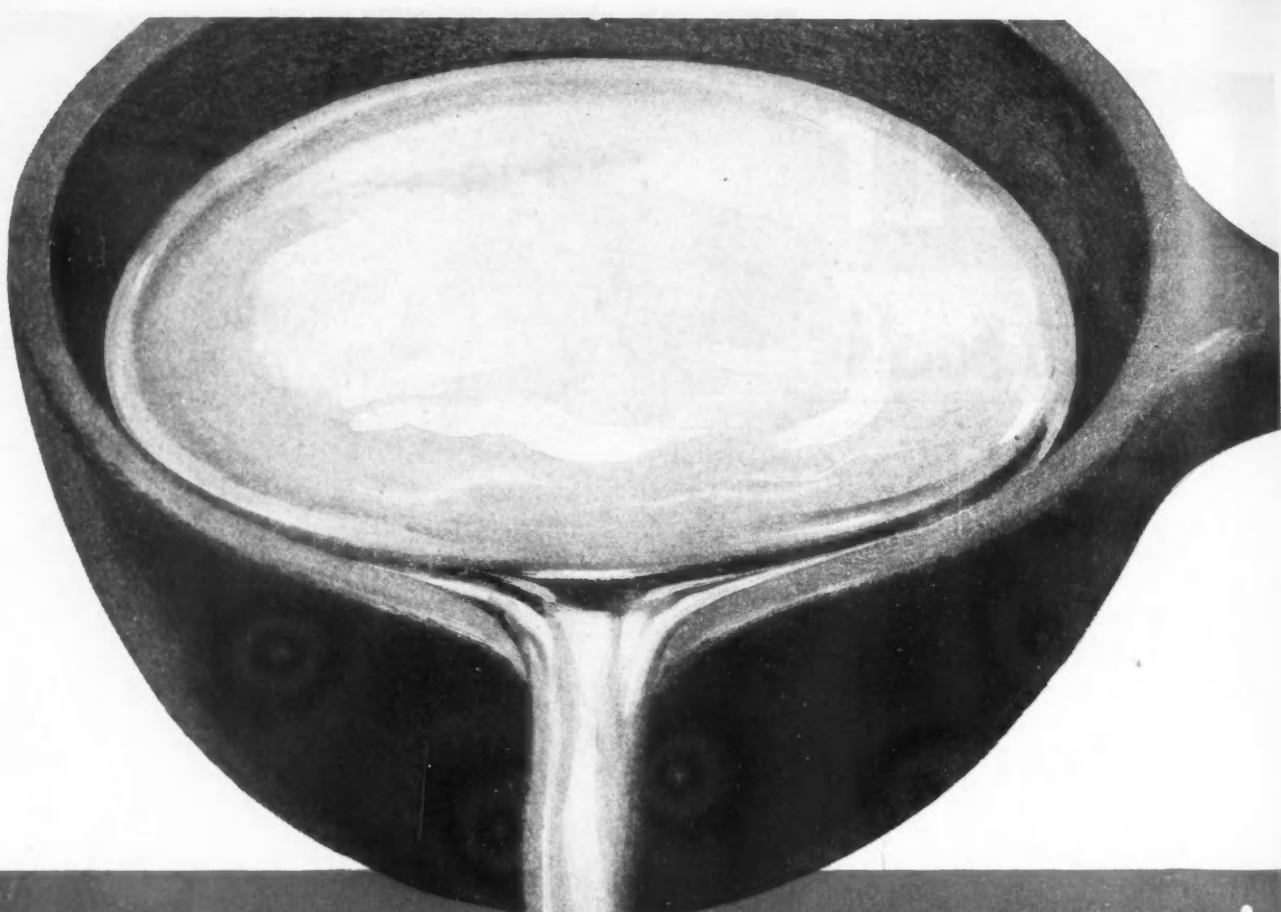
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Offices: New York, Philadelphia, Chicago, Detroit.

Sales Representatives: San Francisco, St. Louis.

*Makes the Felt
for the Parts it Cuts*



Test Your Metal Mettle!

with the
latest Federated
non-ferrous quiz

Federated
METALS DIVISION

AMERICAN SMELTING AND REFINING COMPANY

120 BROADWAY, NEW YORK 5, N. Y.

- | | |
|--|--|
| 1 What is a cause of tin or lead sweat? | 2 What is most likely to cause a sand blow? |
| (a) Inadequate gating | (a) Light ramming |
| (b) Excessive amount of gas in metal | (b) Heavy ramming |
| (c) Risers too small | (c) Improper melting practice |
| (d) Poor pouring practice | (d) Insufficient venting |

**O. K. EXPERTS!
LET'S SEE HOW YOU RATE**

If you bagged 8 or more out of 10, you're hotter than phosphorous out of water. 6 or 7 right entitles you to yell at the boss once a week—but gently!

Less than 6 right gets you the fur-lined melting pot . . . and an invitation to read some of Federated's helpful literature (Experts invited, too!). Just cut out and mail the coupon below.

If you have any foundry problems, Doc Tillity — alias your friendly Federated serviceman—will be glad to help. Call or write any of Federated's 11 plants or 25 sales offices from coast to coast, or Federated Metals Division, American Smelting and Refining Co., 120 Broadway, New York 5, New York.

3 What is one of the causes of the wormy surface sometimes found in the vicinity of the gate?

- (a) Coarse sand
- (b) Low pouring temperature
- (c) Inadequate gating
- (d) Poor pouring practice

4 At approximately what temperature is solution treating of aluminum alloys conducted?

- (a) 300°F
- (b) 975°F
- (c) 212°F
- (d) 1220°F

7 Which alloy has the best corrosion resistance to sea water and brine?

- (a) 88% Cu 8% Sn 4% Zn
- (b) Manganese Bronze
- (c) 85/5/5/5
- (d) Yellow Brass

8 Which of the following is most likely to cause a mis-run?

- (a) Cold metal
- (b) Ramming too heavy
- (c) Gassed metal
- (d) Improper sand conditions

9 At approximately what temperature is artificial aging of aluminum alloys conducted?

- (a) 300°F
- (b) 975°F
- (c) 212°F
- (d) 1220°F

10 What is the melting point of copper?

- (a) 1821°F
- (b) 1932°F
- (c) 2162°F
- (d) 1981°F



Here are the answers:

- 1. (b) Excessive amount of gas
- 2. (d) Insufficient venting
- 3. (c) Inadequate gating
- 4. (b) 975°F
- 5. (c) Practically insoluble
- 6. (a) 100%
- 7. (a) 88% Cu 8% Sn 4% Zn
- 8. (b) Cold metal
- 9. (a) 300°F
- 10. (a) 1821°F

Interested in Die Casting?



Send for this free 24-page illustrated brochure on die casting processes, selection of alloys, effects of impurities, general metallurgy of various alloys, melting procedures, and other informative subjects.

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Please send me the items I have checked:

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- ☐ Non-Ferrous Metals and Alloys booklet
- ☐ Aluminum Casting Alloys booklet
- ☐ Test Bars booklet
- ☐ Reprints of technical articles
- ☐ Reprints of this quiz

Company Name.....

Address.....

Signature.....

Hydraulic Coupling

(Continued from page 78)

at stall at excessive speeds, the drag torque at normal operating stall speed is corrected by the square law up to the speed at which the three per cent slip torque was taken. From the curve shown in Fig. 2, it can be noted that, with the sheet steel construction where it is possible to use a relatively large number of blades without restricting the circuit, it is possible to secure a considerably lower drag torque factor with this construction. The sheet steel

construction becomes uneconomical in the small sizes where it is possible to use aluminum castings. It then becomes extremely difficult to secure performance with the small cast units comparable with that secured by the large ones made either by cast or sheet steel construction.

A small aluminum coupling produced either by the precision sand casting or the permanent mold process is shown in Figs. 3 and 4. This construction has proved most satisfactory on sizes up to 10 in. circuit diameter. The double circuit construction is used to reduce outside diameter for a given horsepower transmission and to eliminate

the inherent hydraulic thrust from a single circuit. Either member may be used as the impeller, although it is normal to use the outside member as the impeller in order to secure best cooling action under high slip conditions.

The larger sizes of couplings upward from 12 in. circuit diameter follow a basically similar design, but are of spot welded sheet steel construction, as shown in Fig. 5. A further reduction in the weight of the unit and the quantity of oil required is secured by flattening out the torus or core ring and inclining the circuits toward each other. This inclined circuit type coupling actually requires about 15 per cent less oil for the same capacity than a similar unit with straight sided circuits. The oil seal is of the same basic construction as that shown for the smaller couplings. On these units the performance is again the same regardless of whether the inner member or the outer member acts as the impeller.

Some Recent Developments In Hydraulic Transmissions

By R. H. Hensleigh,
Consulting Engineer

Hydrostatic and hydrodynamic transmissions each have their own peculiar characteristics, advantages and disadvantages. The hydrostatic transmission possesses extreme flexibility in installation—the power may be transferred to some inaccessible place through tubes or flexible hoses; while hydrodynamic transmissions are compact, self-contained units with concentric shafts. The hydrostatic transmission may be preset to maintain practically any speed ratio through wide variations in torque; while the hydrokinetic transmission, being essentially a self-regulating device, needs no external controls, but must be carefully tailored to match the engine and its load during the initial design stages. The hydrostatic transmission may be reversed or idled by means of a simple four-way valve; while the hydrodynamic transmission generally requires a more complicated gear and clutch arrangement for neutral and reverse.

Unfortunately, neither type of hydraulic transmission is easy to develop into a finished product. The hydrostatic transmission, while it is easy to calculate its performance characteristics, presents mechanical difficulties: high thrust and radial loads on its bearing, high stresses in some of its other parts, the necessity for extreme accuracy in machining and, sometimes, difficult sealing problems; but the hydrodynamic transmission, while it has practically no bearing loads or high stresses to contend with, essentially nothing to wear out and very little machining in it, its performance is quite difficult to calculate, and the number of compromises that must be made in order to achieve the optimum per-

(Turn to page 84, please)



Many forging designs in steel, aluminum and magnesium have been originated by Wyman-Gordon. Typical of the many intricate forgings is this four-way spider. . . . Every Wyman-Gordon forging is under strict, constant control by laboratories that through the years have contributed much to investigation and research of new forging techniques and of new alloys of steel and the non-ferrous light metals.

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EATON

Purveyors of Year-round Passenger Car and Truck Cab Comfort and Safety



This organization originated and perfected the first automobile heater, and for more than 30 years has consistently devoted its research and production facilities to the improvement of automotive heating and ventilating.

Eaton's newly announced fresh air heating, ventilating, and defrosting system—appearing on a number of 1948 automobiles—represents the most modern equipment available for passenger car and truck cab comfort and visibility.

The Eaton Heater Division welcomes the opportunity to work with motor car and truck manufacturers in designing custom built heaters and heating-and-ventilating systems which will provide the most efficient performance for each individual vehicle.

Eaton heaters and heating-and-ventilating systems are sold exclusively to car and truck manufacturers.

EATON MANUFACTURING COMPANY

Heater Division

CLEVELAND, OHIO

(Continued from page 82)

formance in each installation is staggering.

Several experimental automobiles have been built in recent years with infinitely variable hydrostatic transmissions, but so far none of these transmissions has gone beyond the experimental stage. The attractive feature of this transmission, as applied to an automobile, lies in its ability to maintain any speed ratio necessary to achieve the highest over-all power plant efficiency. The hydrostatic transmission also makes possible the use of engines having little flexibility of their

own, such as the Diesel and the two-cycle; and it can be automatically controlled to take a great deal of work out of driving.

Torque Converters: Making Inefficiency Pay Dividends

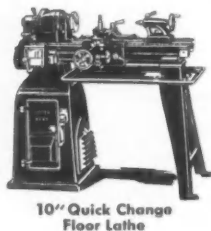
By Robert Lapsley,
Clark Equipment Co.

ONE advantage that a torque converter has over a mechanical drive is that the number of change speed gear ratios can be cut in half; that is, in a tractor which requires six gear ratios when using a mechanical drive,

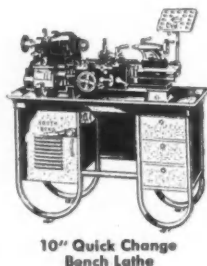
it has been demonstrated that no more than three ratios are required when using a converter. Thus gear changing will be lessened due to the infinitely variable torque ratio provided by the converter.

Besides this lessening of gear ratio changing, the converter will automatically vary its torque multiple to suit the varying resistance of the machine. The machine will be driven faster if light work is encountered, while it will slow-up when meeting heavier work—the converter putting out greater torque at a slower speed when so required, without any attention or selection by the operator. It is this action which causes the unit to always work at its optimum speed, and thereby causes the converter driven unit to out-perform the mechanical drive unit.

However, more fuel is required to accomplish this extra work. But since fuel is cheap in comparison to the operator's pay, the extra work done more than repays the fuel bill. Other benefits derived from the use of a converter include freedom from torsional vibrations and sudden shock loads, which lengthens the usable life of the complete machine. Thus the fewer days per year the machine is laid up for repairs enables it to put in extra days of useful work, thereby earning additional dividends. Also, fewer days lay-off for repairs means fewer repair bills.



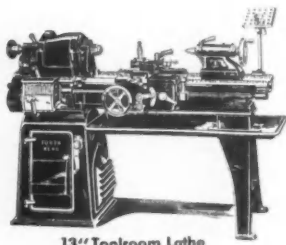
10" Quick Change Floor Lathe



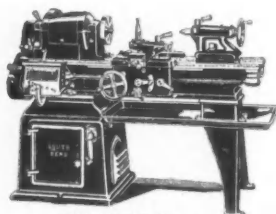
10" Quick Change Bench Lathe



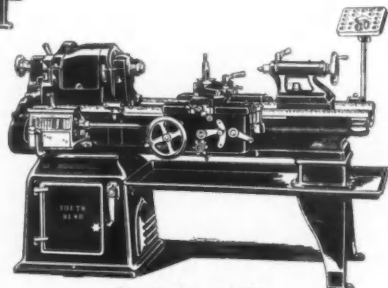
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14 1/2" Quick Change Floor Lathe



16" Toolroom Lathe

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Willys Press Shop

(Continued from page 44)

section parts. Each of the small presses is equipped with a mechanically-operated safety device consisting of two rods sweeping in opposite directions from a central fulcrum so as to cover the entire bed area.

Good housekeeping of exceptional character is afforded by the provision of a belt type scrap conveyor traversing the entire Clearing line in a tunnel built considerably below floor level. Each of the presses in the line has a chute of suitable size through which the trim and scrap are dropped by the operator. The chutes unload directly onto the moving belt. At the end of the press line, the belt discharges onto an inclined belt section running at right angles to the collector belt, thus making delivery to the scrap baler in another part of the plant.

The operator at the baler has a control panel which enables him to control the movement of the conveyor system in accordance with the operation of the baler, which is loaded from a hopper mounted at the terminal end of the belt, and is arranged to make up bales of about 1000 lb.

Although the Clearing presses can handle large stampings, the present setup is designed to make a variety of

(Turn to page 86, please)

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TRUCKS

—picked by the TRUCK MEN *who know!*

Spicer Power Transmission Equipment is used in a large majority of the *trucks* being manufactured in America.

Spicer has over 43 years experience in the design, development and manufacture of Universal Joints, Propeller Shafts, Axles, Clutches, Transmissions and Auxiliaries.

Spicer developed the Universal Joint for automotive use, and has made many other distinctive advancements in the industry. Spicer engineers will work with you on the adaptation of Spicer Power Transmission Equipment to your particular needs.

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TRANSMISSIONS • TORQUE CONVERTERS • PASSENGER CAR AXLES • CLUTCHES
STAMPINGS • UNIVERSAL JOINTS • SPICER "BROWN-LIPE" GEAR BOXES • RAILWAY

PARISH FRAMES
GENERATOR DRIVES

Willys Press Shop

(Continued from page 84)

the smaller stampings required for the current models, including—front and rear fenders, hood tops, side panels, splash apron, and floor pans. Starting at the front end of this press line, the first four presses are set up for making front fenders or side panels, generally speaking the objective being to use multiple-station dies. The front fender blank is designed to make two fender stampings at a time, the parting being done after initial forming. The

fender requires four settings in the large presses and a minor operation in a small press installed between the first two units.

The floor pan and hood top—made in separate runs, of course—are produced in a line-up of five presses, the first operation being done in a double-action press. The splash apron is produced in a four-press sequence, the first stage being done in a triple-action Clearing.

Square-sheared blanks are used on some of the parts, shearing being handled in one of several of the new Cincinnati shears with hydraulic hold-downs. One of these has a 14-ft bed and can accommodate either a number

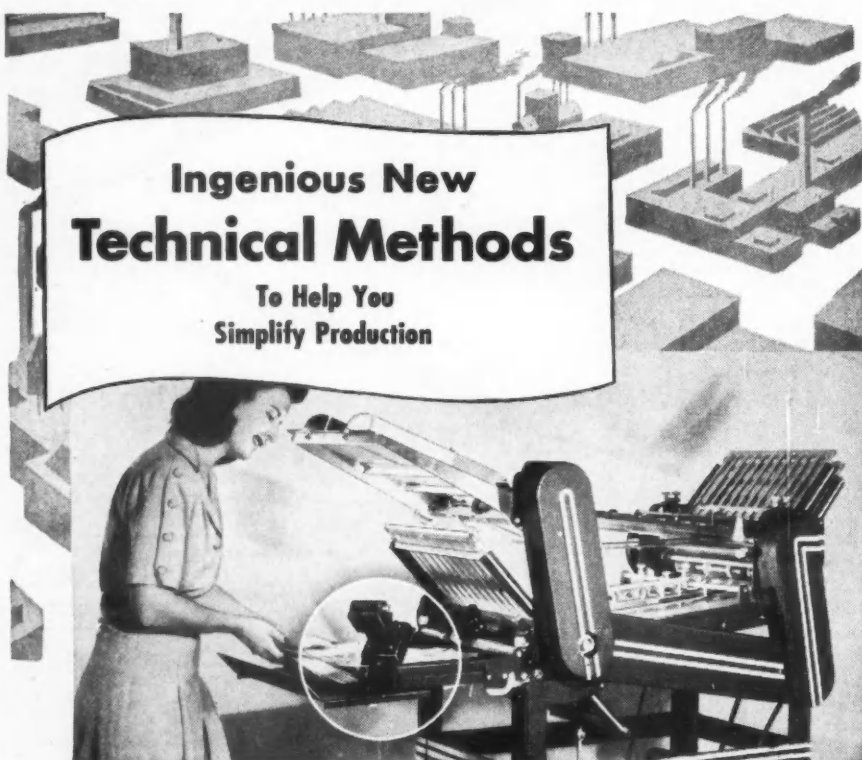
of small sheets or the largest sheets that may be used here.

In keeping with good automotive press shop practice, all blanks required for outside panels, fenders, etc., are given a pass through the familiar McKay stretcher leveler to assure surfaces free from stretcher strains and "worms." The first station of this machine washes the sheet with a kerosene solution and scrubs the surface clean.

Another element contributing to all around efficiency is the monorail conveyor which traverses the Clearing line and on which are loaded all finishing stampings, the larger parts being hung directly on hooks while small pieces are loaded in tiered racks fixed to the conveyor chain. The conveyor dips at certain stations to facilitate loading.

This simple monorail serves a number of functions. With a developed length of some 1400 ft, it transports all stampings from each unit of the press shop through a washing and rust-proofing machine, then to the metal-finishing department on the second floor of the same building. The return line of the conveyor moves along the wall to one side of the press line. The washing machine, a large unit made by R. C. Mahon of Detroit, automatically washes all parts with a hot alkali solution, rinses, then sprays them with a rust preventive. The latter operation assures freedom from rusting while in storage awaiting routing in the metal finish department.

As mentioned earlier, the variety of small stampings required for brackets and other fittings for body and chassis are produced on the line of Bliss inclinable presses arranged in another section of the shop so as not to interfere with the activity along the Clearing line.



Instantaneous Production Control With Improved Electric Counter

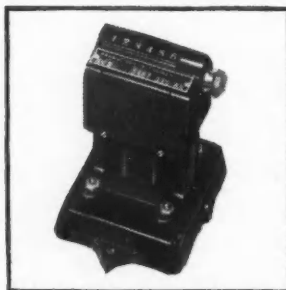
Accurate, up-to-the-minute counting of the production on this Davidson Folding Machine is done with the WIZARD Electric Counter.

New opportunities for more efficient production and elimination of over-run waste are created by WIZARD Electric Counters. These electrically-operated devices count any object or motion that will operate a switch, relay or photo-electric unit. Objects can be counted photo-electrically without physical contact and without risk to fragile or freshly-painted objects.

The Counters can be installed at any distance from the switch or photo-electric unit where the count originates. Or, they can be mounted on panels in the Production Department and arranged so that a production supervisor can maintain up-to-the-instant counts of all operations throughout the entire plant.

You can also count on chewing gum to help employee's on-the-job efficiency. Chewing gum helps relieve tension—keeps the throat moist—and prevents "false thirst" yet leaves hands free for work. That's why more and more plant owners are making Wrigley's Spearmint Gum available to everyone.

Complete details may be obtained from Production Instrument Company, 710 West Jackson Boulevard, Chicago 6, Ill.



The Wizard Electric Counter



Geneva Trade Agreements

(Continued from page 46)

Big Concessions by Norway

NORWAY—Among the most important concessions received from Norway were those on automobiles and aircraft. The duty on passenger cars was reduced from 50 per cent ad valorem to 30 per cent, while the rate on trucks was lowered from 24 per cent to 20 per cent, and the rate on aircraft from 24 per cent to 12 per cent. Parts for automobiles and aircraft were lowered from 40 per cent to 25 per cent. Tractors and parts were bound free.

SOUTHERN RHODESIA—The present five per cent general rate was bound against increase on certain types of agricultural machinery and implements, motor ambulances, trucks and vans, and their chassis, and tractors and parts. The duty on motorcycles and parts was reduced from 100 per cent (4/5 of the duty is now temporarily suspended) to 33 1/3 per cent.

(To be continued)

This ring

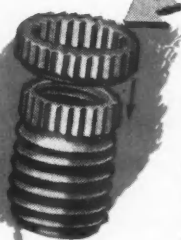
LOCKS Inserts or Studs to Parent Materials



Rosán Locking System prevents loosening or turning—even under vibration

Studs and inserts become an integral part of the parent material with the Rosán Locking System. A ring, serrated both inside and out, locks its inner teeth with the mated collar on the stud or insert, and the outer teeth broach

their way into the parent material. Result—a completely permanent installation that can't loosen or turn—yet can be removed easily, if desired, without injuring the parent material.

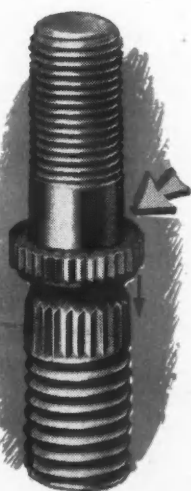


FASTENERS CAN'T PULL OUT OF SOFT MATERIALS with this Threaded Steel Hole

Rosán Inserts . . . give soft materials the strength of a steel tapped hole to hold fasteners in position under both tension and torque. A serrated ring locks the insert to the parent material so that it can't loosen,

turn, or pull out of aluminum, soft metals, plastics or wood.

This threaded steel hole can be removed easily with an ordinary drill and any simple wedging tool—and replaced easily—without disturbing the parent material.



ROSÁN STUDS STAY TIGHT

Rosán Studs . . . can't loosen or turn—even under vibration—because the serrated ring locks the stud to the parent material. Rosán Studs can be removed and replaced easily—with simple tools.

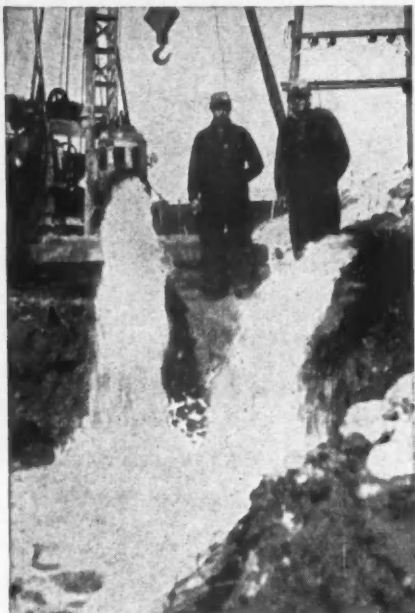
Write today for a catalog showing applications of Rosán Inserts and Studs made by National.



THE NATIONAL SCREW & MFG. COMPANY, CLEVELAND 4, OHIO

December 1, 1947

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Layne Well Water Systems are widely used throughout Canada, serving cities, mines, paper pulp mills, air fields and army camps. As is the case elsewhere, these Canadian installations are highly efficient, produce large quantities of water and are exceptionally dependable in all kinds of weather.

For late literature, catalogs, bulletins, etc., address: LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

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General News

(Continued from page 23)

Studebaker Prices for 1948

Showing increases along the line, Studebaker factory delivered prices for 1948, fob South Bend, Ind., follow:

1948 MODEL (7G) STUDEBAKER CHAMPION	
DeLuxe Models	
4-Door Sedan	\$1545.75
2-Door Sedan	1514.25
5-Passenger Coupe	1540.50
3-Passenger Coupe	1445.75
Regal DeLuxe Models	
4-Door Sedan	1619.50
2-Door Sedan	1587.75
5-Passenger Coupe	1614.00
3-Passenger Coupe	1519.25
Convertible	1969.75
1948 MODEL (15A) STUDEBAKER COMMANDER	
DeLuxe Models	
4-Door Sedan	1850.75
2-Door Sedan	1819.25
5-Passenger Coupe	1845.50
3-Passenger Coupe	1750.75
Regal DeLuxe Models	
4-Door Sedan	1972.00
2-Door Sedan	1940.25
5-Passenger Coupe	1966.50
3-Passenger Coupe	1872.00
Land Cruiser	2143.50
Convertible	2325.25

Budd Co. Announces New Railway Disk Brake

Under development for 10 years, the Budd Co.'s new model CF railroad disk brake can reportedly stop a railway passenger car without passenger discomfort from 60 mph in less than 1000 ft; from 80 mph in less than 1600 ft; and from 100 mph in less than 2500 ft. Budd's disk brake is described as a friction device in which stationary asbestos-lined shoes grip both sides of a revolving disk attached to the axle. This disk has numerous internal fins which dissipate the heat rapidly and keep the disk and the shoes cool.

New Air Reduction Research Laboratory

A modern new research laboratory containing approximately 78,000 sq ft of floor space and employing about 250 research technicians and workers was formally opened recently by Air Reduction Co. at Murray Hill, N. J. Activities will be devoted primarily to the development of apparatus, machinery and processes for fabricating, heat treating and refining metals, it was announced. Examples of such research being the injection of industrial gases into molten metals, the oxy-acetylene cutting of steel while the metal is still hot and surface conditioning or scarfing of stainless steel.

(Turn to page 90, please)



You specify... AND BOOTH CONFORMS AGAIN AND AGAIN!

Yes, Booth meets specifications for cut felt parts *precisely*... often to tolerances usually associated only with metals. On re-orders, felt parts are duplicated exactly.

We're specialists in uniformity of grade and cutting... and your order, small or large, receives our interested attention.

APPLICATION CHART AND SAMPLE KIT... contains swatches of S.A.E. felt types, with specification tables. Write for it. (No sales follow-up.)

THE BOOTH FELT COMPANY
481 19th Street Brooklyn 15, N. Y.
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Booth

TRADE MARK

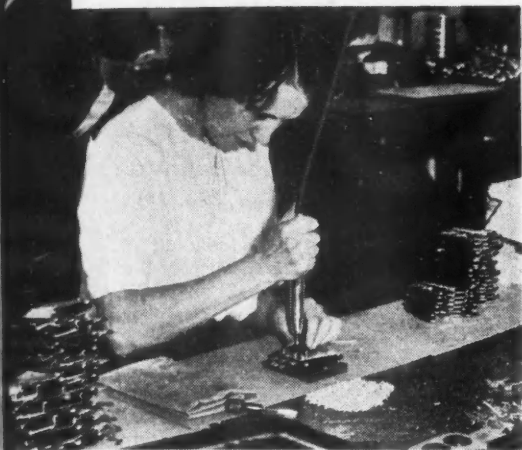
PRECISION CUT FELT PARTS



Tightening screw in drive unit assembly.
Aro Model 22LAH.

PRODUCTION COSTS GO DOWN

with **ARO** tools on
assembly lines



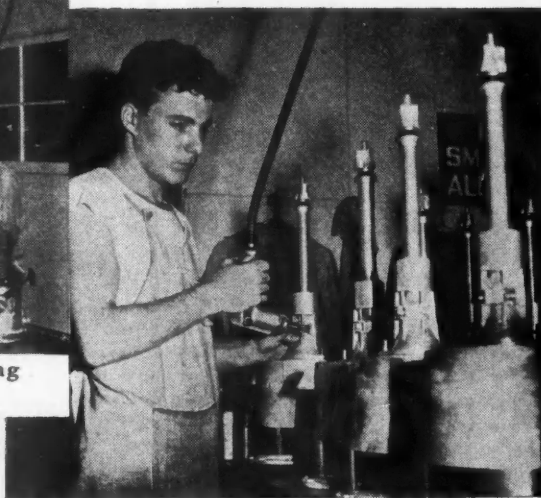
Driving No. 2 self-tapping screw in switch
on controls. Aro Model 7000.

The General Electric Company, Trenton Plant, manufacturer of automatic washers installed Aro screw drivers, nut setters, balancers, oilers and filters on assembly lines. The result—complete assemblies faster . . . with *less labor* and *lower cost*! Also, inspection showed that torque requirements were "right on the nose".

It will pay you to have a trained Aro field engineer check your assembly problems. An on-the-job study may reveal many ways to increase your production, reduce fatigue and cut costs with ARO Air Tools. The Aro Equipment Corporation, Bryan, Ohio.



Tightening screws in drive assembly, using
Aro Model 22LAH.

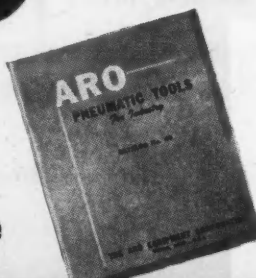


Tightening bolts on balance ring hub.
Aro Model 106 Impact Wrench.



Driving down screw on flanges of apron,
using Aro Model 22LPH.

ARO AIR TOOLS



Send for Catalog!

The Aro Equipment Corporation, Bryan, Ohio.

Without obligation, please send us your new fully illustrated Air Tool catalog No. 46 which also gives complete specifications on all Aro tools and accessories.

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General News

(Continued from page 88)

1947 AIA Directory Lists Aircraft Specifications

Listing U. S. civil aircraft performance specifications, the 1947 directory issued by the Aircraft Industries Association shows that 25 American manufacturers are currently offering 51 aircraft models. In 1946, a similar directory listed 29 companies offering 47 models.

Lancia and Fiat To Make New Models

It is understood that Lancia, Turin, Italy, has placed on the market a new type of motor truck, having a carrying capacity of 14 tons, of the Esatau type provided with a direct injection six-cyl Diesel engine developing 124 hp and a speed of about 37 mph. The truck is only designed to overcome gradients of 26 per cent; when coupled with a trailer of 14 tons it can overcome gradients of 13 per cent.

The Fiat, Turin, is considering

placing on the market during next spring a new version of the 500 car (Topolino) in which the engine, though maintaining its old capacity of 35 cu in., is to have overhead valves. The power of the engine is to be increased from 12 to 16 hp insuring a speed of about 56 mph.

Convair Continues Tests On Its Flying Automobile

Consolidated Vultee's experimental flying automobile, which ran out of gasoline, and crashed on Nov. 18 near San Diego, Calif., still will be tested for mass production. Powered by a Lycoming engine developing 190 hp, the four place flying automobile has an all-metal wing with a span of 34.5 ft. It had previously been test-flown successfully.

Automobile Old Timers Elect Officers for 1948

At the recent organization meeting of the directors of the Automobile Old Timers, the following officers were elected for 1948: Alfred P. Sloan, Jr., honorary president; Arthur Lee Newton, president; David C. Fenner, first vice-president; George M. Slocum, second vice-president; William L. Hughson, third vice-president; George H. Robertson, treasurer; and Frederick H. Elliott, secretary.

Rolls-Royce Dart Flies

A new 1000-hp turbo-prop aircraft engine, the Rolls-Royce Dart, installed in the nose of a modified four-engine Lancaster, is reported to have made its first flight in England recently. The Dart has a two-stage centrifugal compressor which is driven by a two-stage turbine mounted on the same shaft, and seven combustion chambers of the straight-through type. A three-blade propeller is geared to the turbine shaft. Maximum power developed is reported to be 1000 hp plus 325 lb static thrust. The Dart has a maximum diameter of 32 in., installed weight (including propeller) of 1075 lb, and a length (with exhaust) of 98 in.

32nd Indianapolis Race To Be Held May 31, 1948

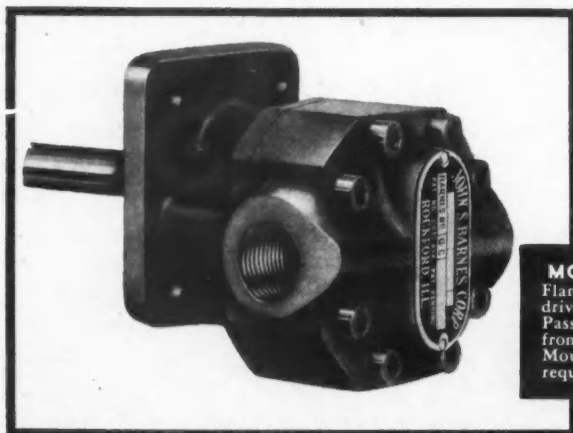
The 32nd International 500 Mile Race at Indianapolis will be held Monday, May 31, 1948. Advance orders for seats are now being filled.

Deere Subsidiary Leases Plants in Ottumwa, Iowa

More expansion by the Deere Co. is evidenced with the leasing of (Turn to page 92, please)

John S. BARNES

Constant-flo ROTARY GEAR PUMPS



MODEL PA-7100-A-8
Flange mounted, direct drive, without built-in By-Pass Valve. Six capacities from 20 to 360 GPH. Mountings to suit your requirements.

Unique Gear-Tooth Structure on BARNES Pumps Offers OUTSTANDING ADVANTAGES



Special design of the gear teeth produces substantially a rolling action that reduces friction and gives

longer life. Complete filling of mating space produces a perfect seal, reduces slippage to a minimum, eliminates the common gear tooth vacuum condition that causes detrimental aeration and foaming, and provides efficient displacement resulting in superior performance. Elimination of overhang gives greater strength and increased capacity to absorb strain and shock. This tooth design is an exclusive, patented BARNES feature.

BARNES Constant-Flo ROTARY GEAR PUMPS are precision manufactured by craftsmen to split-thousandths tolerances on special

mass production machinery. This, together with superior design features, insures that every Barnes Pump you buy will achieve a uniformly high level of performance and will equal or exceed the quality of construction of the equipment on which it is used. These pumps have proven successful in severe service on transit coach torque converter transmissions, Diesel Engine fuel transfer, engine lubrication, and many other applications.

Write today for descriptive literature and engineering data sheets suggesting numerous applications.

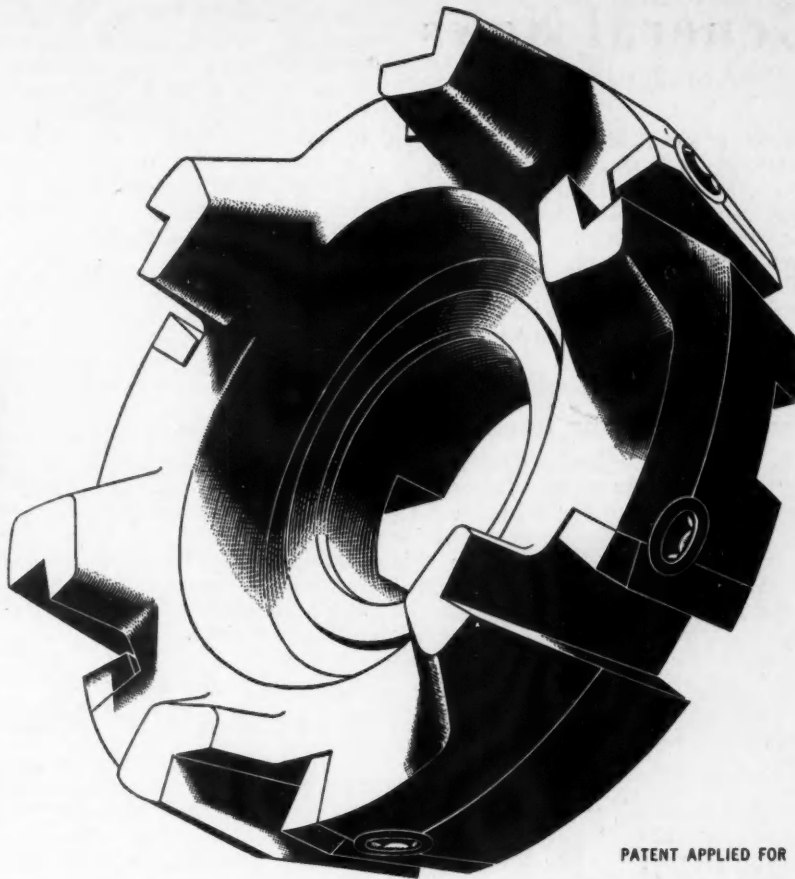


JOHN S. BARNES CORPORATION
301 S. Water St., Rockford, Illinois

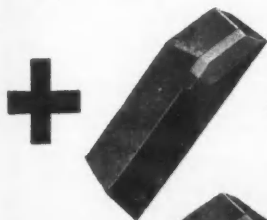
Compact, Efficient, HIGH QUALITY, Long-Life Oil Pumps

NOW

**you can use the
SAME cutter body**

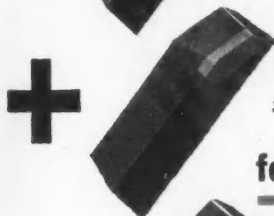


PATENT APPLIED FOR



STANDARD BLADES MX-100

for cutting steel



STANDARD BLADES MX-200

for cutting cast iron



STANDARD BLADES MX-300

for non-ferrous metals



Once the blades are slipped in and lock screws tightened, your milling cutter is ready to go to work, as blades are furnished with all clearance angles precision-ground. Blades may be re-sharpened individually on a carbide grinder and quickly reassembled in the body, or the assembled cutter may be re-sharpened in the conventional manner on a cutter grinder. Write for illustrated folder which gives complete data and prices.

The GAIRING

E-CON-O-MILL

*A New Carbide Face Mill Made in
Standard Sizes 5-inch Diameter and over*

REDUCE DOWN-TIME OF YOUR MACHINES

CUT DOWN YOUR TOOL INVENTORY

THE GAIRING TOOL COMPANY, 21221 Hoover Road, Detroit, Michigan

General News

(Continued from page 90)

over nine naval air station buildings in Ottumwa, Iowa, by the Dain Mfg. Co., a Deere subsidiary. At an annual rental of \$37,500, the lease is for two years, with an option to renew for three years. The new facilities will be used to produce automatic hay presses, and will initially employ about 200 persons.

Jamaican Government Bans American Vehicle Imports

It seems to be fashionable for foreign governments to ban imports of American made motor vehicles. Latest addition to the list of countries restricting entry of cars from this country is Jamaica which has banned the import of motor cars from the United States and Canada for six months. The import of trucks has been shut off for three months.

New Fast Personal Plane, Aero-Flight's Streak-125

The Streak-125, reported to be the world's fastest personal airplane, has been announced by the Aero-Flight Aircraft Corp., Long Beach, Cal. Powered by a Continental engine,

which develops 125 hp, the plane is said to have a maximum speed of over 200 mph, and a cruising speed of over 190 mph, with a useful load of 600 lb. The plane's gross weight is 1560 lb. The Streak-125 is the de luxe version of the Streak-85, previously announced.

Graham-Paige Extends Rototiller Export Rights

Graham-Paige Motors Corp. has extended the sales rights for the Rototiller to all countries except Switzerland and Great Britain. Its previous agreement with the Swiss holder of patent rights limited manufacturing sales to North and South America only. To date, export sales have amounted to about 10 per cent of total volume, but under the new arrangement are expected to climb to about 25 per cent. The company has made and sold about 40,000 Rototillers a year.

Kaiser-Frazer Expands Detroit Engine Div. Plant

Although there has been considerable speculation about the location of the proposed new Kaiser-Frazer engine plant, it is believed that the new facility will not be started for a considerable period. Initial efforts of the expanded engine program will be

concentrated at the engine division plant in Detroit, which is currently producing up to 100 engines an hour. In addition to the \$2 million already expended on machines and equipment by K-F, another \$3 million will be expended for modernizing new equipment and facilities for stepping up production.

New Navy System Reduces Aircraft Fire Hazards

A new system for reducing aircraft fire hazards by blanketing vacant spaces, inside and around the fuel tanks with low oxygen-content gases from the engine exhaust has been successfully installed in two Navy planes, the Navy has announced. The system, which involves the cooling of inactive exhaust gases by a heat exchanger, before they are led through a small bleed line into the gasoline tank, was developed for the Bureau of Aeronautics by the Curtiss-Corp. and Cornell University.

Obituary

Royden Sheeler

Royden Sheeler, Eastern sales representative, American Hammered Piston Ring Co., died on Nov. 7 in Philadelphia.



Hand Finishing Costs are High!

ELIMINATE HAND-FINISHING BOTTLENECK!

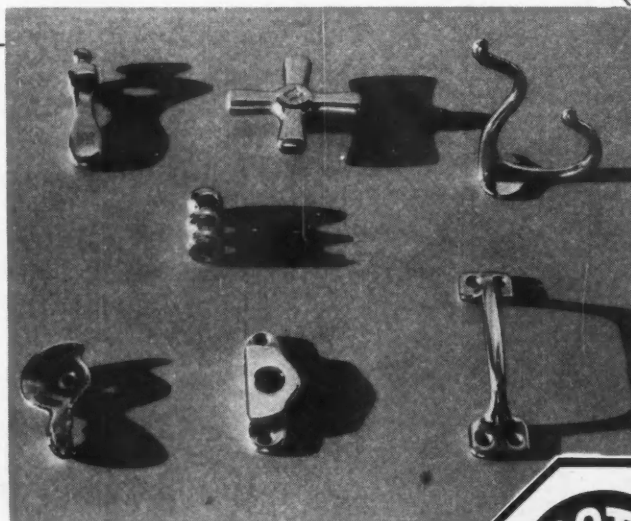
WITH ROTO-FINISH MECHANICAL FINISHING!

Speed Finishing Time and Cut Costs with ROTO-FINISH

Labor costs make hand finishing a bottleneck, which Roto-Finish solves by finishing mechanically, stampings, forgings, die castings, sand castings and machined parts.

1. Produces a surface comparable to hand finishing.
2. Cuts cost from 35% to 60%.
3. Produces a more uniform finish on quantity lots.

Roto-Finish not only slashes cost—it is far more accurate. Standards can be set up for finishing that provide the exact surface required on every piece. Let us process sample parts. No obligation. THE STURGIS PRODUCTS CO., 773 Jacobs Street, Sturgis, Mich.



THE UNIFORM MECHANICAL PROCESS—
FOR GRINDING • DE-BURRING • POLISHING
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Mechanical Roto-Finish Costs are Low!



Amazing **IMPACT** wrench revolutionizes nut running

Put this remarkable high-cycle Impact Wrench on your toughest job . . . you'll get no kick—no twist—no torque reaction.

"Rotary impacts" make this wrench more powerful than any other electric tool of comparable size. From now on do it the easy way—the Impact way.

Send for descriptive flier, Form 5011, or call our nearest branch office for a demonstration of this outstanding High-Cycle Impact Wrench.

HIGH-CYCLE IMPACT WRENCHES

Size	4E	8E
Speed (rpm)	1070	1200
Impacts per min.	2000	2150
Length (overall)	10 ³ / ₄ "	14-1/16"
Capacity (bolt size)	up to ³ / ₈ "	up to ⁵ / ₈ "
Weight (lbs.)	6 ⁵ / ₈	15
Distance (side to center)	1 ³ / ₄ "	17 ⁷ / ₈ "

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AIR TOOLS • ROCK DRILLS
COMPRESSORS • TURBO BLOWERS
CENTRIFUGAL PUMPS • CONDENSERS
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If you have a SPECIAL PROBLEM

in any of these operations, where precision work is demanded and where greater production at man-hour savings is paramount—

• BORING—rough, semi-finish and finish • MILLING (special types) • STRAIGHT LINE DRILLING • UNIVERSAL ADJUSTABLE SPINDLE DRILLING • HONING • TAPPING • REAMING • COUNTERBORING • VERTICAL AND WAY-TYPE EQUIPMENT...

then a Moline Multiple Spindle Specially Designed machine tool is your answer. Moline tools are ruggedly built and engineered to fit your PARTICULAR requirements, they're made to last for years, they're easy to change over to other jobs, they do better work at less cost and stand up to it longer.

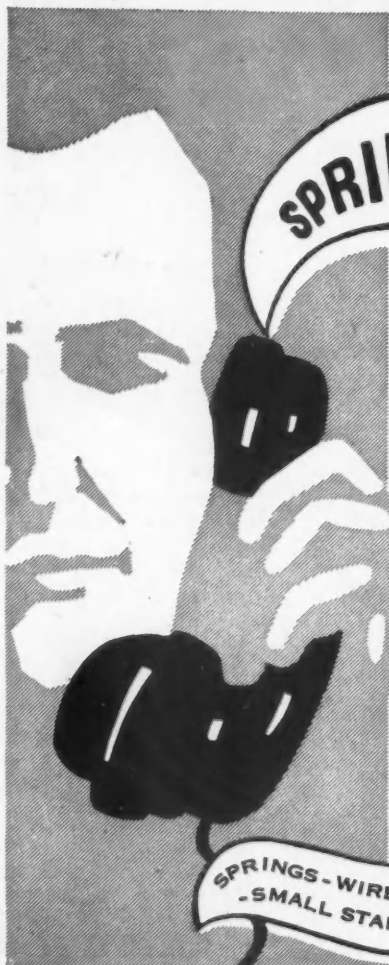
For YOUR special problem, go "HOLE-HOG," write us for any information you may need.



MOLINE TOOL COMPANY

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To
B-G-R

SOLVE your spring requirements the simple way—by putting them squarely up to B-G-R.

PROFIT by long-time experience in springs and intricate metal parts.

SAVE time and trouble by letting B-G-R recommend.

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BARNES-GIBSON-RAYMOND

DIVISION OF ASSOCIATED SPRING CORP.

Detroit • Ann Arbor
MICHIGAN

SPRINGS-WIRE FORMS
-SMALL STAMPINGS

Publications

(Continued from page 60)

D-134—Lead and Lead Lined Valves

American Smelting & Refining Co., Federated Metals Div.—An illustrated booklet showing their line of lead and lead lined valves includes special photographs of each major valve type manufactured, all of which are designed for use where corrosive fluids are a problem. Text describes the corrosion resistant qualities of the valves, and specifies the various uses for each.

D-135—Contour Grinding

Porter-Cable Machine Co.—A new bulletin describes the principles of contour grinding and the benefits derived from the new method of polishing contoured pieces of work on an especially shaped wheel. Various models are shown with complete specifications.

D-136—Extra-Heavy Protective Coating

United Chromium, Inc.—An elastic, baking synthetic is described in a new 4-page bulletin on Unichrome Coating 218. The information indicates its advantages for use on any parts or equipment which need extra-tough coatings.

D-137—Boring Tools

Kaukauna Machine Corp.—A new bulletin on Kwik-Size Boring Tools illustrates a number of typical industrial boring applications and lists the performance of the Kwik-Size Boring Tools through a comprehensive sequence of operations.

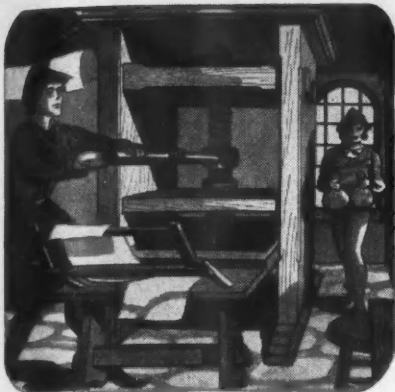
D-138—Brushing Catalog

The Osborn Manufacturing Co.—A new 76-page catalog presents numerous illustrations of industrial brushing operations in addition to photographs and description of the company's complete line of power, paint, varnish and maintenance brushes. The new catalog No. 200, includes a 3-page digest of the origin of Osborn brush materials from many parts of the world. A section is devoted to factors involved in selecting the right brush for specific jobs, includes operating equipment requirements, brush characteristics, operating conditions, surface speeds, etc.

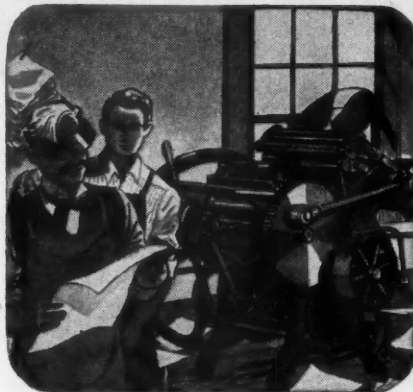
D-139—Sheer-Speed Shapers

Michigan Tool Co.—An 8-page technical bulletin No. 1800-47 describes its line of shapers, shows how various splines, cams, gears, etc. may be rapidly produced on the shapers and features a series of close-up action shots showing the shapers in a variety of jobs.

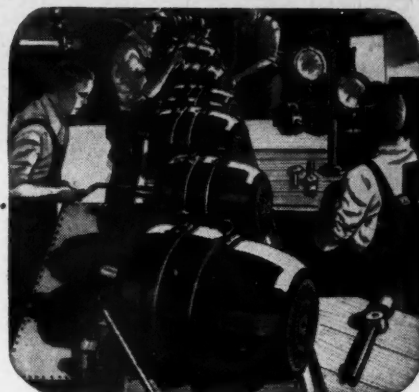
Complete specifications for four available models, with descriptions of the coolant and lubrication systems are included.



1 1450—First printing presses stemmed from cheese or cider presses. Gutenberg's hand press used type carved from wood and metal. Four centuries later printing was still largely a manual operation. But the Industrial Revolution was near.

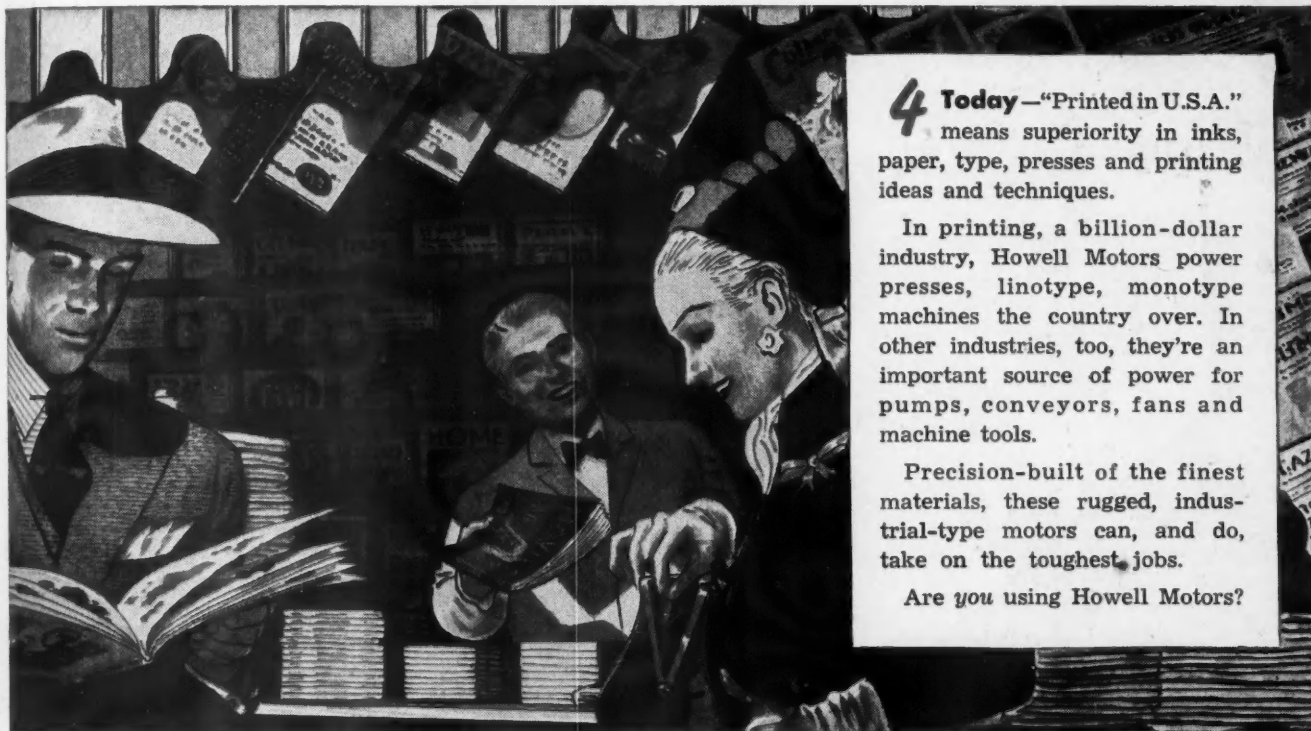


2 1875-95—Electric power revolutionized printing. Hand work gave way to powered presses and machines. Foot treadles and hand cranks disappeared. Low cost electricity started printing on its way to becoming a modern art.



3 1930—Whereas, Gutenberg was 7 years printing 200 copies of his Bible—presses of the thirties did the job in 20 minutes! In 1915 Howell "Red Band" motors were introduced. They won instant acclaim in this and other industries.

"Printed in U. S. A."—and how!



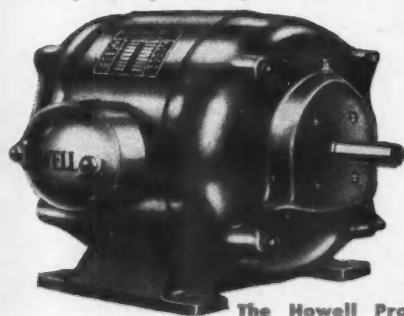
4 Today—"Printed in U.S.A." means superiority in inks, paper, type, presses and printing ideas and techniques.

In printing, a billion-dollar industry, Howell Motors power presses, linotype, monotype machines the country over. In other industries, too, they're an important source of power for pumps, conveyors, fans and machine tools.

Precision-built of the finest materials, these rugged, industrial-type motors can, and do, take on the toughest jobs.

Are you using Howell Motors?

Here's another precision-built Howell Motor . . . industrial type with copper or bronze rotors . . . specially insulated . . . statically and dynamically balanced.



The Howell Protected Type Motors

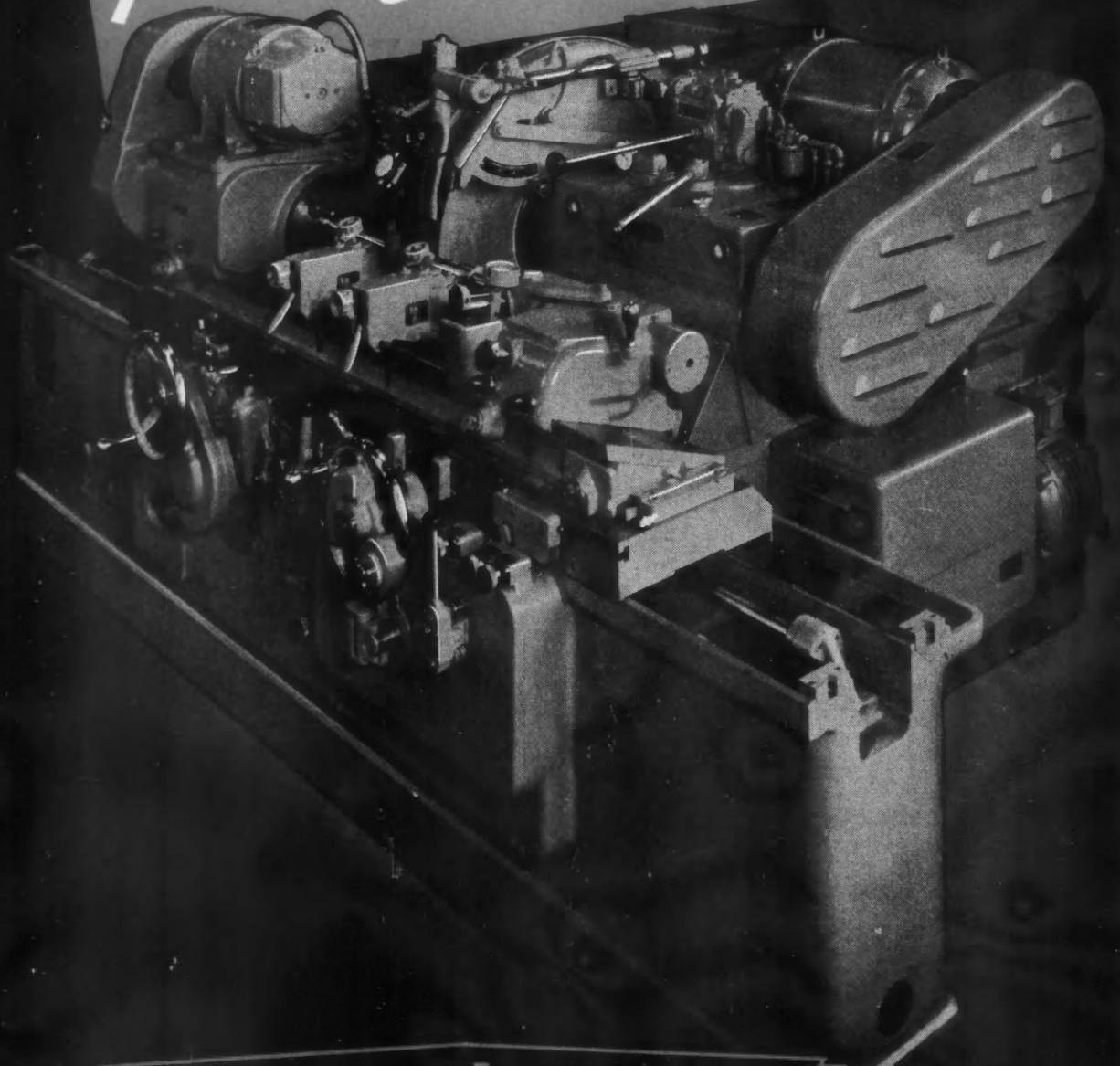
HOWELL MOTORS

HOWELL ELECTRIC MOTORS CO., HOWELL, MICH.

Manufacturers of Quality Industrial Type Motors Since 1915



*One of the
Hits of the Show...*



NORTON GRINDERS
and Lappers

ABRASIVES — GRINDING WHEELS — REFRACTORIES — POROUS MEDIUMS — NON SLIP FLOORS — NOWRIDE TRIPACT

The *NEW* NORTON TYPE CTU CYLINDRICAL GRINDERS

PERHAPS you saw them in action yourself at Chicago, saw how they were designed for your *maximum convenience* — easy to operate, easy to maintain — and to give you *minimum production costs*.

Whether your production requirements are large volume or small you'll like the steady, dependable operation of the new Norton Type CTU's. Their ability to produce high accuracy at high speed assures the favorable work cost that is so essential to meet today's competition.

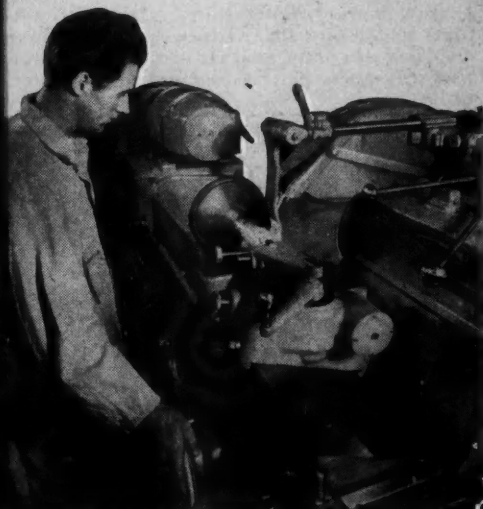
The Type CTU's are available in swing capacities of 6" and 10", in several lengths in each, and either plain or semiautomatic arrangements. Catalogs giving further details on request — no obligation.

NORTON COMPANY, WORCESTER 6, MASS.
Distributors in All Principal Cities

M-552

DESIGN HIGHLIGHTS of the Type CTU

- Base ways protected at all times by space-saving steel strip guards.
- Smooth all Vee-belt driven headstocks.
- Separate right and left hand table dwell controls.
- Automatic wheel feed at each table reversal.
- Automatic coolant control.
- Automatic work start and stop with jogging control also provided.
- Hinged wheel guard cover and rear base design facilitates wheel changes.
- Wheel feed controls easily operated and conveniently grouped.
- Sensitive, easily operated hand table traverse.
- Piston rods always in tension —no buckling.
- Pumps and electrical equipment located for maximum accessibility.
- Sizing accuracy and finish maintained by well proportioned design.



GRINDING MACHINES BEHR-MANNING DIVISION COATED ABRASIVES AND SHARPENING STONES

PERSONALS

Recent Personnel Changes and Appointments at the Plants of Automotive and Aviation Manufacturers and Their Suppliers.

General Motors Corp.—C. O. Miller has been appointed to handle special assignments; H. L. Dingler succeeds him as head of purchasing and salvage and Paul A. Switzer becomes director of the industrial engineering section.

White Motor Co.—H. Neil Mallon, elected to fill vacancy on Board of Directors created by death of W. King White.

Perfect Circle Corp.—George Stout has been placed in charge of sales for the company's two new products, Plastigage and Bearing Adjusters.

Chrysler Corp., Airtemp Div.—W. C. Newberg has been made President, succeeding D. W. Russell, who is retiring.

Willy-Overland Motors — Joseph B. Overman has been appointed Asst. to the Treasurer, assuming the duties of A. E. Barton, resigned. R. R. Hessler becomes Chief, Treasury Planning Dept.

Kaiser-Frazer Corp. — Walter De Martini has been appointed Director of Service.

General Electric Co., Chemical Dept. —T. Norman Willcox appointed manager of the Methods and Equipment Laboratory of the Plastics Div.

Tucker Corp.—M. W. Dulian, General Sales Manager in charge of all sales activities.

International Harvester Co.—Albert W. Scarratt, Vice-Pres. in Charge of Engineering and Patents, has retired. A. E. W. Johnson has been appointed Director of Engineering.

Dearborn Motors Corp.—B. A. Best elected Secretary-Treasurer. Joseph B. Legler named National Service Manager.

Thompson Products, Inc.—A. L. Pomeroy has been appointed Staff Engineer. Foote Bros. Gear and Machine Corp.

—R. B. Moir promoted to Asst. Vice-President in charge of Engineering and Product Development of the Industrial Gear Div. B. H. Quackenbush has been made Sales Manager of the division.

The Hydraulic Press Manufacturing Co.—Walter G. Tucker elected Chairman of the Board, replacing Colonel H. A. Toulmin, Jr., resigned. Paul C. Pocock, formerly Vice-President in Charge of Sales, becomes Executive Vice-President and General Manager. Warren R. Tucker was elected to fill the newly created post of Vice-President in Charge of Engineering and Research.

L. G. S. Spring Clutch Corp.—James C. Esterline has been appointed General Manager.

The Cleveland Graphite Bronze Co.—Charles A. Dilley has been made Asst. to Executive Vice-President James L. Myers.

Federal Electric Products Co.—Robert C. Graves, Vice-President in Charge of Sales.

Air Reduction Co., Inc. — Charles D'W. Gibson and John A. Hill, Vice-Presidents of the company, were elected directors.

Vanadium-Alloys Steel Co.—W. R. Mau and Lynn A. Smith were elected to the Board of Directors, succeeding the late Fred P. Underwood and the late T. Howe Nimick.

Pittsburgh Plate Glass Co.—Thomas G. Wright appointed Asst. to the General Supt., Plate Glass Factories.

Fairchild Engine and Airplane Corp.—Walton B. St. John appointed Sales Manager of the Personal Planes Div.

Tuthill Pump Co. — Lee H. Benson made Vice-President in Charge of Manufacturing.

The Budd Co. — Ernest B. Schmidt has been made Plant Manager and Edward J. Deisley, Executive Engineer, appointed special sales representative for Detroit.

Pharis Tire & Rubber Co.—William M. Moser has been named Technical Director.

General Tire & Rubber Co.—Larry M. Baker, Manager, of interplant technical service.

Menasco Manufacturing Co.—Henry P. Nelson, elected President.

National Tool & Die Manufacturing Assoc. — W. R. White, Jr., elected President and J. J. Kohl, First Vice-President.

3 OF A KIND -



Completely
INTERCHANGEABLE

Complete interchangeability is highly important today in units which operate continuously or for long periods under a variety of conditions. If breakdown should occur, a new part may easily be installed and operation resumed in short order.

Original gears for such units, and also replacements must have positive guaranteed accuracy, tooth form and finish, or the mechanism may fail. Our completely modern shop, equipment and methods, can serve you with assurance on such requirements. Write us for quotation on your specifications.

THREAD GRINDING

SMALL OR MEDIUM
WORMS AND GEARS

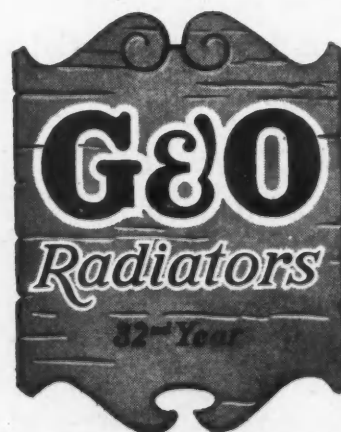
SPUR, HELICAL, BEVEL,
SPROCKETS AND SPLINES



Beaver Gear Works Inc.

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AUTOMOTIVE and AVIATION

ENGINE COOLING RADIATORS

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